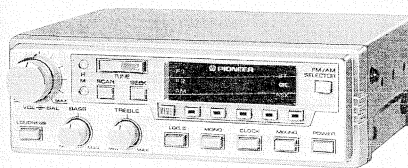


Service Manual



ORDER NO.
CRT-273-0

COMPONENT CAR STEREO AM/FM ELECTRONIC TUNER

GEX-90

US, CA

NOTE: The ICs (symbol No. IC3 and IC4) in the Tuner Unit have been changed as follows:

	Parts No. for IC3 and IC4	
	LA2101 and LA3370P	LA2110 and LA3375
GEX-90/US	Serial No. 00001 ~ 02800*	Serial No. 02801 and after
GEX-90/CA	Serial No. 00001 ~ 00600*	Serial No. 00601 and after

* Refer to page 39 ~ 46 for the Tuner Unit, schematic circuit diagram, adjustment method and parts list.

SPECIFICATIONS

General

Power source DC14.4V (10.8 ~ 15.6V allowable)
 Grounding system Negative type
 Dimensions 150(W) × 50(H) × 134(D) mm
 (5-7/8(W) × 2(H) × 5-1/4(D) in.)
 Weight 1.1 kg (2.4 lbs.)
 Tone controls (bass) ±10 dB (100 Hz)
 (treble) ±10 dB (10 kHz)
 Loudness contour +12 dB (100 Hz), +4 dB (10 kHz)
 (volume: -30 dB)
 Maximum output level More than 200 mV
 Output impedance 1.8kΩ

FM Tuner

Frequency range 87.9 ~ 107.9 MHz
 Usable sensitivity 16.8 dBf (1.9μV/75Ω, mono)
 50 dB quieting sensitivity 19.2 dBf (2.5μV/75Ω, mono)
 Alternate channel selectivity 70 dB (±400 kHz)
 Distortion 0.3% (at 65 dBf, 1 kHz, stereo)
 Frequency response 30 ~ 15,000 Hz (±3 dB)
 Stereo separation 40 dB (at 65 dBf, 1 kHz)

AM Tuner

Frequency range 530 ~ 1,620 kHz
 Usable sensitivity 18μV (25 dB) (S/N: 20 dB)
 Selectivity 50 dB (±10 kHz)

Note:

Specifications and the design are subject to possible modification without notice due to improvements.

These specifications were determined and are presented in accordance with specifications standards established by the Ad Hoc Committee of Car Stereo Manufacturers.

CONTENTS

1. CIRCUIT DESCRIPTION	1	4. SCHEMATIC CIRCUIT DIAGRAM	24
2. PARTS LOCATION	14	5. CONNECTION DIAGRAM	29
3. ADJUSTMENT		6. CABINET EXPLODED VIEW	30
3.1 FM IF Adjustment	15	7. CHASSIS EXPLODED VIEW	31
3.2 Auto Level Adjustment	15	8. ELECTRICAL PARTS LIST	34
3.3 FM MPX Adjustment	15	9. PACKING METHOD	37
3.4 FM Tracking Adjustment	16	10. TUNER UNIT (CWE-430)	39
3.5 FM Stop Sensitivity Adjustment	17	11. SCHEMATIC CIRCUIT DIAGRAM	41
3.6 AM IF Adjustment	18	12. ADJUSTMENT	44
3.7 AM Tracking Adjustment	19	13. PARTS LIST	45
3.8 AM Stop Sensitivity Adjustment	20		

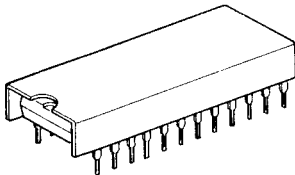
CAUTION

When Handling IC PD7003

Please Observe:

IC PD7003 (IC1 in the control unit) is a C-MOS IC of extremely low power consumption and very high input impedance. Unless handled with special care, it could be damaged by static electricity induction. This IC is supplied with a shorting, cap (of aluminium foil) attached. When soldering, or performing other repair work, always attach this cap as shown below. Remove the cap after the repair has been completed.

Also, this type of IC must not be inserted in a polystyrene package for storage.



1. CIRCUIT DESCRIPTION

• Block Diagram

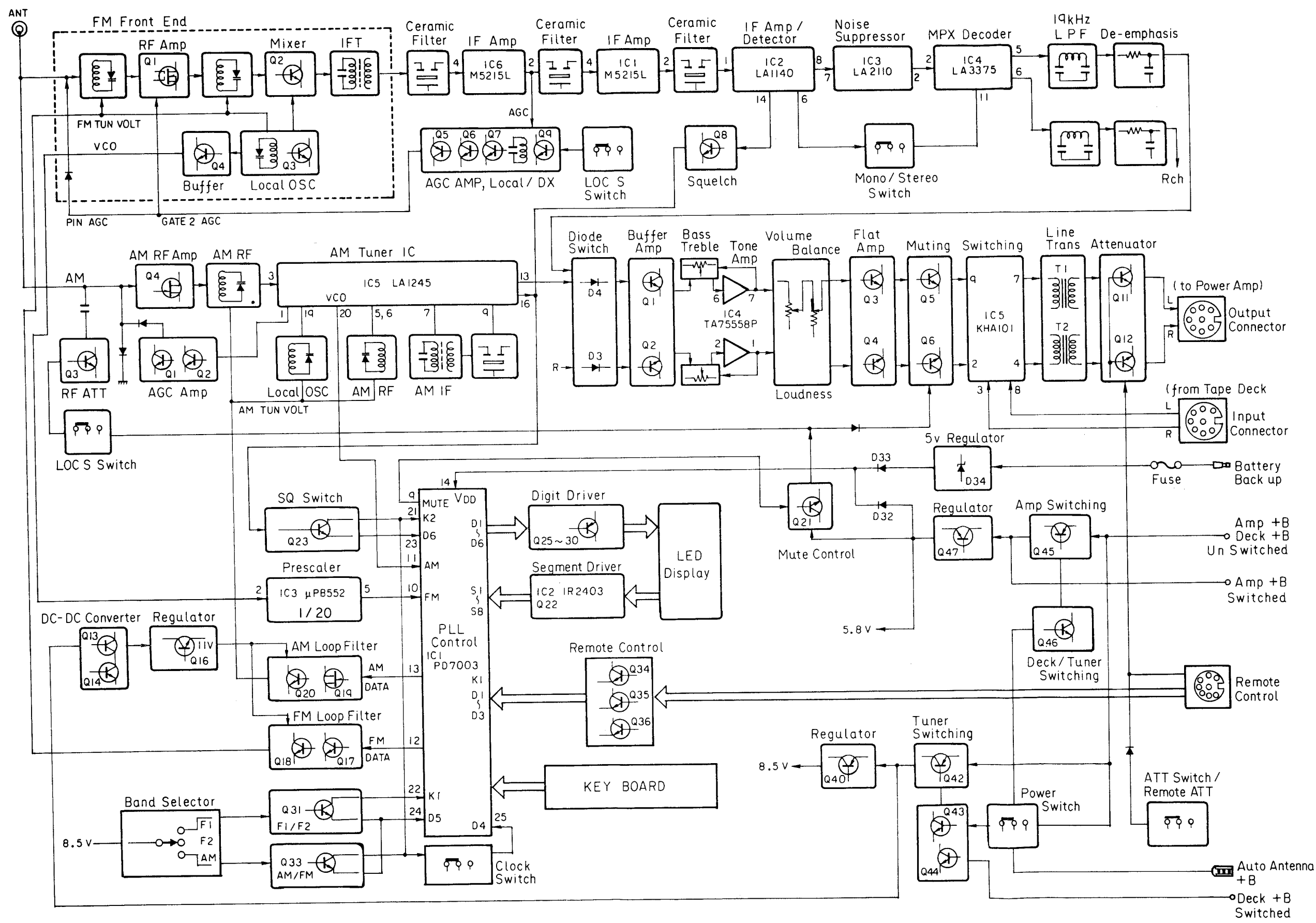


Fig. 1

1.1 TUNER SECTION

(Refer to the schematic circuit diagram.)

• FM Front End

The FM front end is composed of a 1-stage RF amplifier (which uses a dual gate MOS FET), a MIX circuit and a modified crop type oscillator circuit. The output oscillated by OSC circuit (Q3) is input to the control unit via OSC buffer circuit (Q4) and the tuning voltage is controlled with the PLL locked local oscillating frequency being used as a standard. This tuning voltage is applied to the respective twin composition varicap diodes (D2 and 3, D4 and 5 and D6 and 7) of the ANT, RF and OSC circuits of the FM front end and the tuning circuit is formed in the ANT and RF circuits, and the local oscillating frequency (reception frequency +10.7 MHz) is oscillated in the OSC circuit. As for the signal coming in from the antenna, the signal of the tuning frequency is selected using the ANT circuit (L2, D2, D3, C2, TCI, etc.). This signal is selected and amplified using dual gate MOS FET (Q1) and RF circuit (L3, D4, D5, TC2, C5, etc). This selected and amplified signal, along with the signal oscillated by the OSC circuit is added to MIX circuit (Q2) base and is output to the 2nd side of IFT (T1) as an intermediate frequency (IF) of 10.7 MHz. Furthermore, as a strong input countermeasure, the 2nd gate voltage of Q1 of the RF circuit is normally 6.5V. During strong input, it is 0V and the gain of Q1 goes down. Also, the input is attenuated using AGC diode (D1).

• IF Amp Detection Circuit

The IF signal (10.7 MHz) output from the FM front end goes through ceramic filters (CF1, CF2) and IC6 and is amplified by differential amp IC (IC1), then goes through CF3 and is input to pin 1 of IF amp detection IC LA1140 (IC2). An explanation of each pin of IC2 follows:

- Pin 1 : IF input
- Pins 2 & 3 : IF amp
- Pins 4 & 10 : GND
- Pin 5 : When in ARC and no signal is present, the noise level is determined using the resistance value of resistor (R8) between the pin and GND.
- Pin 6 : Mute in
If grounded, soft mute is ineffective and the noise level goes up when no signal is present and -3 dB limiting takes effect. (GND when in MONO)
- Pin 7 : AFC
- Pin 8 : Detector output
- Pin 9 : IF out
- Pins 11 & 13 : Quadlatcher detection stages
- Pin 12 : +B

Pin 14 : Mute drive

Mute output is output when signals are weak or detuning. When there is no signal, output is 2 to 3V. If this voltage is applied to Pin 6, current flows to Pin 6. Gain changes according to the amount of current and soft mute becomes effective. Also, this mute output is 2 to 3V when no signal is present. When a signal is present, it becomes 0V and this voltage is used for the following scan stop operation.

SCAN AND SEEK STOP

During SCAN or SEEK operations, when no signal present, 2 to 3V is output from Pin 14. Therefore, Q8 comes ON. If Q8 is ON, the collector becomes 0V and Q23 of the control unit goes OFF. While Q23 is OFF, SCAN or SEEK operations continue. If a signal comes in from the ANT, Pin 14 goes to 0V and Q8 goes OFF and Q23 comes ON. If Q23 is ON, the signal goes to Pin 21 from Pin 23 of PD7003 and key sensing SCAN or SEEK operation stop.

Pin 15 : Signal strength indication output

DC voltage (about 0V when no signal is present and approximately 5V when ANT input is 60 dB) is output in proportion to the input signal level. This voltage is applied to Pin 7 (stereo demodulation output high cut control terminal) and Pin 8 (separation terminal) of IC4. If the applied voltage is lowered, the amount of high cut increases and separation gets bad.

Pin 16 : AGC output terminal

4V when no signal is present. As the input signal increases, the voltage drops to 0V. Also, the IF amplifier gain changes according to the value of the resistance between Pin 16 and GND. (The greater the resistance value, the higher the gain.)

• PNS Circuit

LA 2110 (IC3) is the FM noise cancel IC. FM detector output is input to Pin 7. C and R between Pins 5 and 6 are circuits which pass and delay signals below 100 kHz using low pass filters. C and R between Pins 6 and 9 are circuits which detect noise elements above 100 kHz using high pass filters. Using this noise element (mainly ignition noise), the IC internal signal related gate circuit goes ON and OFF and cuts the signal OFF for short periods of time when noise is present.

• MPX Circuit

LA3375 (IC4) is a PLL FM multiplex stereo demodulator IC. If the stereo composite signal is input along with a 19 kHz pilot signal, the IC internal VCO is locked at 19 kHz and the left and right channels are extracted using a 38 kHz switching signal.

1.2 CONTROL SECTION

• Basic Operation Concept

PLL synthesizer basic composition is shown in Figure 2. The output signal f_s of the voltage controlled local oscillator circuit (VCO) is divided into $1/N$ number of frequencies using the programmable divider. The output signal of the crystal controlled timing generator and the phase are compared. The phase comparator output becomes DC voltage V_T using the loop filter and controls the VCO output frequency. In this closed loop (PLL), since the relationship of $f_s/N=f_r$ is established, $f_s=Nf_r$. If f_r (standard frequency) is fixed, f_s is determined by N . Since the programmable divider can change the divide ratio N using the program signal, VCO output signal f_s is determined by the program signal and becomes an N multiple (integer multiple) of standard signal f_r .

• AM Tuner

AM uses electronic tuning tuner IC LA 1245 (IC5). The signal input from the ANT is received in an untuned condition using FET (Q4) and is selected and amplified using a tuning circuit composed of coil (T6), varicap (D8-1) and trimmer (TC1) and is input to Pin 3. Pin 3 becomes the input of the IC internal RF amp and as the selectivity is further increased using tuning circuit (T7, D8-3, TC2, etc.) of Pin 5, the RF is amplified. That signal is input to Pin 6 and mixed with the oscillator frequency using the IC and output to Pin 7. The intermediate frequency extracted from Pin 7 using IFT (T8) and the ceramic filter is input to input Pin 9 of the IF amp and then from Pin 10 is amplified and input to Pin 11 of the detection circuit. Then the detection output is output from Pin 13. Pin 1 is the AGC terminal and the RF and AGC are set using this voltage. For Pin 1, when no signal is present, it is approximately 4.7 to 4.8V. If ANT input increases, the voltage decreases. This voltage is reversed using Q2 and Q1 comes ON, and by D5 and D6 coming ON, the ANT input decreases.

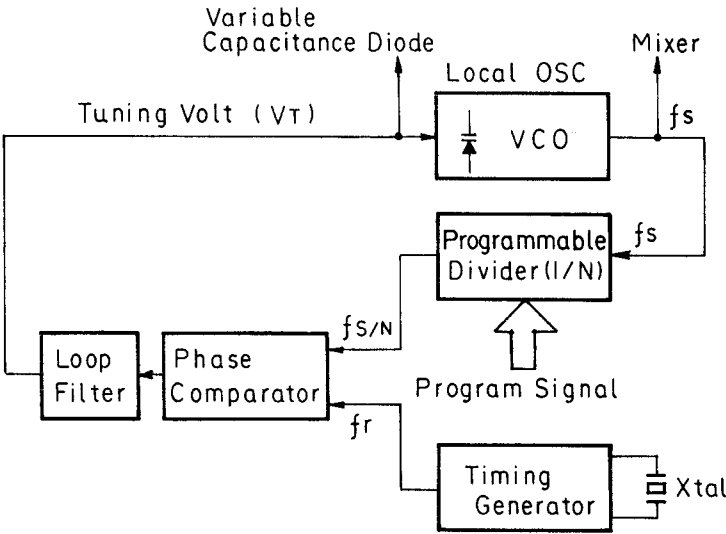
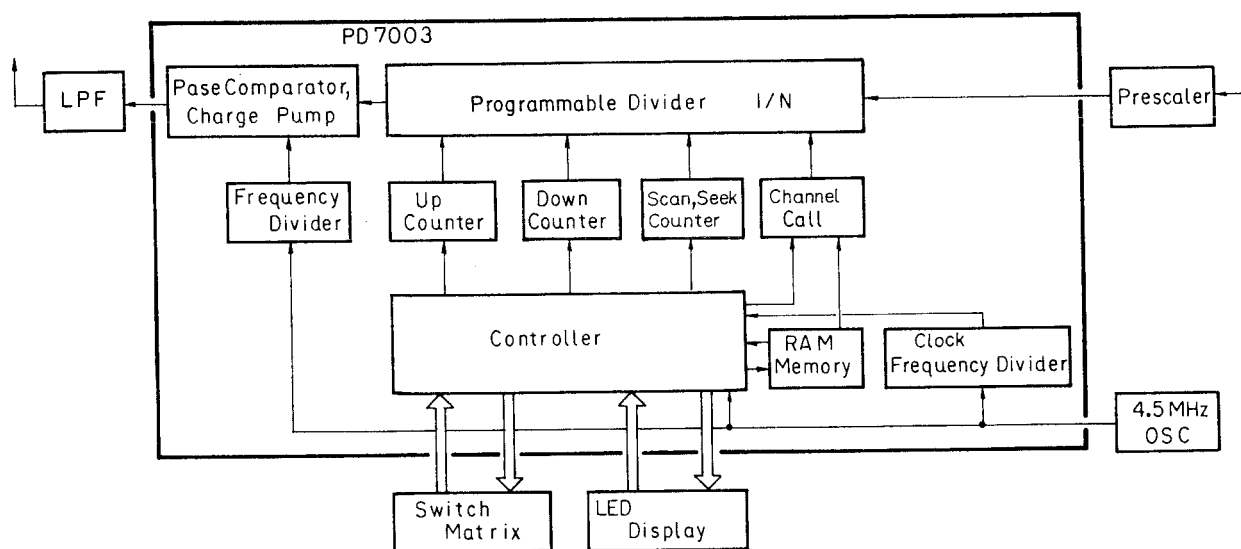


Fig. 2

• Functions of Control IC PD7003

PD7003 is a 28-Pin C MOS LSI and is the PLL synthesizer tuner control IC which has been developed so that receiving and digital display can be made in 200 kHz steps for FM and 10 kHz steps for AM. By connecting PD7003 to the later mentioned switch matrix, the IC internal micro-computer operates according to a prewritten program and SCAN, SEEK, memory, etc., control operations can be performed. Also, by connecting a display LED driver, receiving frequency and time can be displayed on the digital display. Figure 3 shows a block diagram of PD7003 and terminal explanation.



PD7003

TERMINAL NUMBER	SYMBOL	FUNCTION	TERMINAL NUMBER	SYMBOL	FUNCTION
1 to 8	S1 to S8	display segment drive output	15	VSS	power supply terminal common ground
9	MUTE	muting output during tuning operation	16 and 17	Q IN and Q OUT	4.5 MHz crystal oscillator circuit input and output
10	FM IN	FM station input	18	CS	chip selector input CS="L" also, key input inhibit using OPEN and tuner operation using CS="H"
11	AM IN	AM station input	19 to 22	K1 to K4	key sensing input
12	FM DO	FM phase comparison output	23 to 28	D1 to D6	display digit drive output/key scan output
13	AM DO	AM phase comparison output			
14	VDD	power supply terminal +5V			

Fig. 3

• FM Mode

Figure 4 is a PLL loop construction diagram which shows the FM mode. The VCO (FM front end) frequency f_{vco} , after amplification by buffer amp (Q4) is divided into 1/20 using a prescaler (control unit IC3). Since the high speed switchable limit of the FM IN (Pin 10) of PD7003 is 7.2 MHz, this prescaler divides f_{vco} into approximately 5 MHz increments. Then that prescaler's output signal is input to Pin 10 of PD7003 and further divided into 1/2 and goes into the programmable divider and is divided using the applicable divide ratio. Also, the 4.5 MHz (X1) which becomes the clock (basic control frequency) of PD7003 is divided into 1/900 increments using the frequency divider and a standard frequency f_r of 5 kHz is generated. This becomes the digital phase comparator's standard and the output signal of the programmable divider and digital phase are compared and a pulse which is based on 5 kHz is output from FM DO (Pin 12) via the charge pump. This output pulse is input to the loop filter (active filter composed of Q17 and 18) and converted to DC voltage, by applying it to the number 7 terminal of the FM front end as tuning voltage V_T . The oscillating frequency of the local oscillating circuit (VCO) is fixed and the PLL loop goes into a locked condition. Also, V_T changes to approximately 3.5 to 9V, and by controlling ANT, RF and VCO, the receiving

frequency is determined and maintained. The formula for the preceding is shown below:

$$\frac{f_{vco}}{\frac{20}{2}} \quad / \quad N = f_r = 5 \text{ kHz}$$

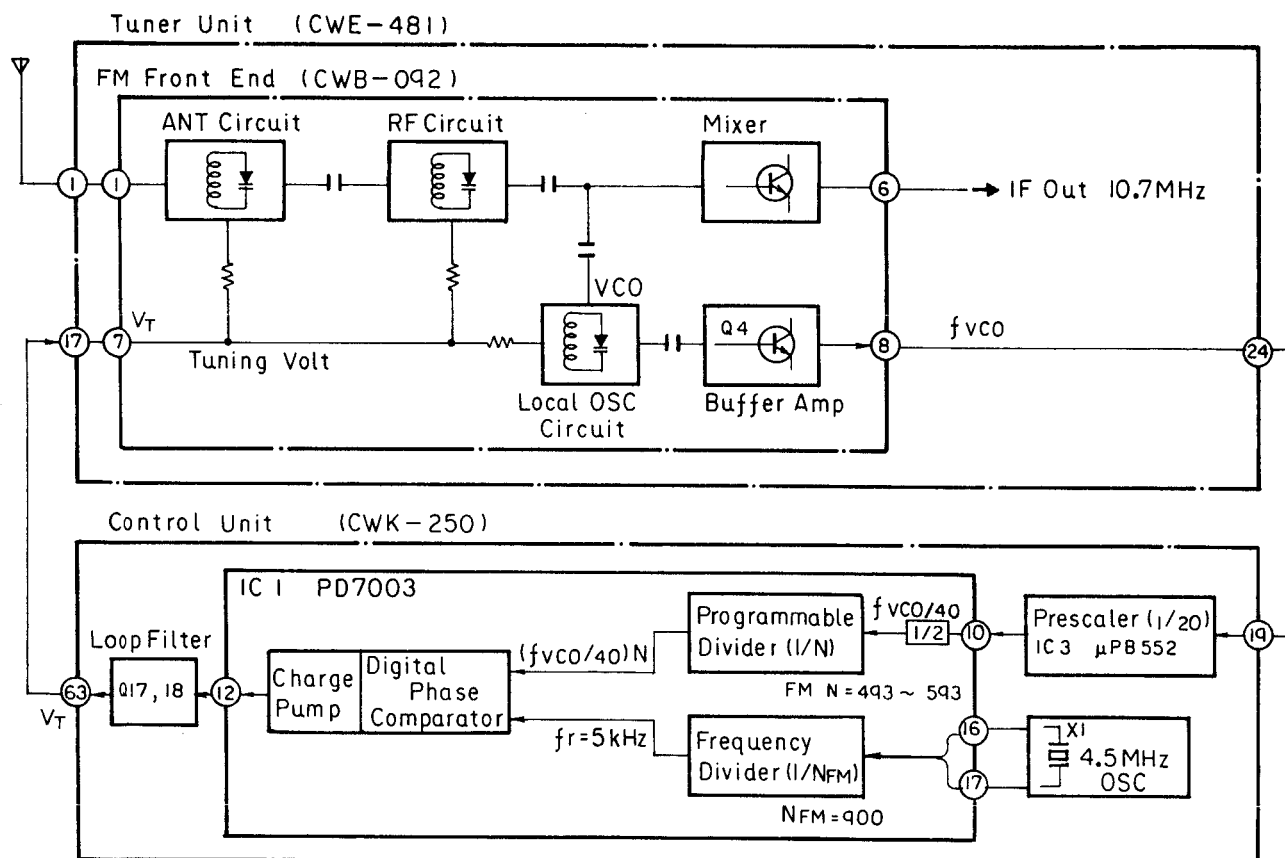
$$f_{vco} = 2 \cdot N \cdot 20 \cdot f_r = N \times 200 \text{ kHz}$$

$$2 \cdot 20 \cdot f_r = 200 \text{ kHz} = \text{channel space}$$

In other words, the N of the programmable divider is counted one by one and, as a result, the receiving frequency changes in 200 kHz steps. Here, the receiving frequency band is 87.9 to 107.9 kHz and since the IF is set at 10.7 MHz, the local oscillating frequency f_{vco} become 98.6 to 118.6 MHz. This f_{vco} is divided into 1/20 by prescaler (IC3) and becomes 4.93 to 5.93 MHz. Additionally, it is divided into 1/2 by the prescaler which is built-in to PD7003 and becomes 2.465 to 2.965 MHz. By making the divide ratio N of the programmable divider 493 to 593, the output becomes

$$\frac{(f_{vco}/20)}{2} \quad / \quad N = 5 \text{ kHz}$$

The standard frequency f_r (5 kHz) and digital phase are compared using the digital phase comparator and the output goes through the charge pump and loop filter and becomes the tuning voltage which is applied to the varicap of the tuning circuit and becomes the local oscillating frequency.



FM MODE

Fig. 4

• AM Mode

This operates in a similar manner to the FM mode. However, since the receiving frequencies are set in 10 kHz steps, the standard frequency f_r for performing phase comparison is 10 kHz. This is done by dividing the output of 4.5 MHz (X1) which becomes the clock of PD7003 into 1/450 using the frequency divider. Here, the receiving frequency band is 530 to 1620 kHz. Since the IF is set to 450 kHz, the local oscillating frequency f_{vco} becomes 980 to 2070 kHz. This output signal is input directly into AM

IN (Pin 11) of PD7003 via the buffer amp of AM IC LA 1245. Therefore, by setting the programmable divider's divide ratio N to $N = 98$ to 207, the output becomes $f_{vco}/N = 10$ kHz. Using the digital phase comparator, the standard frequency f_r (10 kHz) and digital phase are compared and that output is applied to the tuning circuit varicap via the charge pump and loop filter and becomes the tuning voltage and the local oscillating frequency is determined.

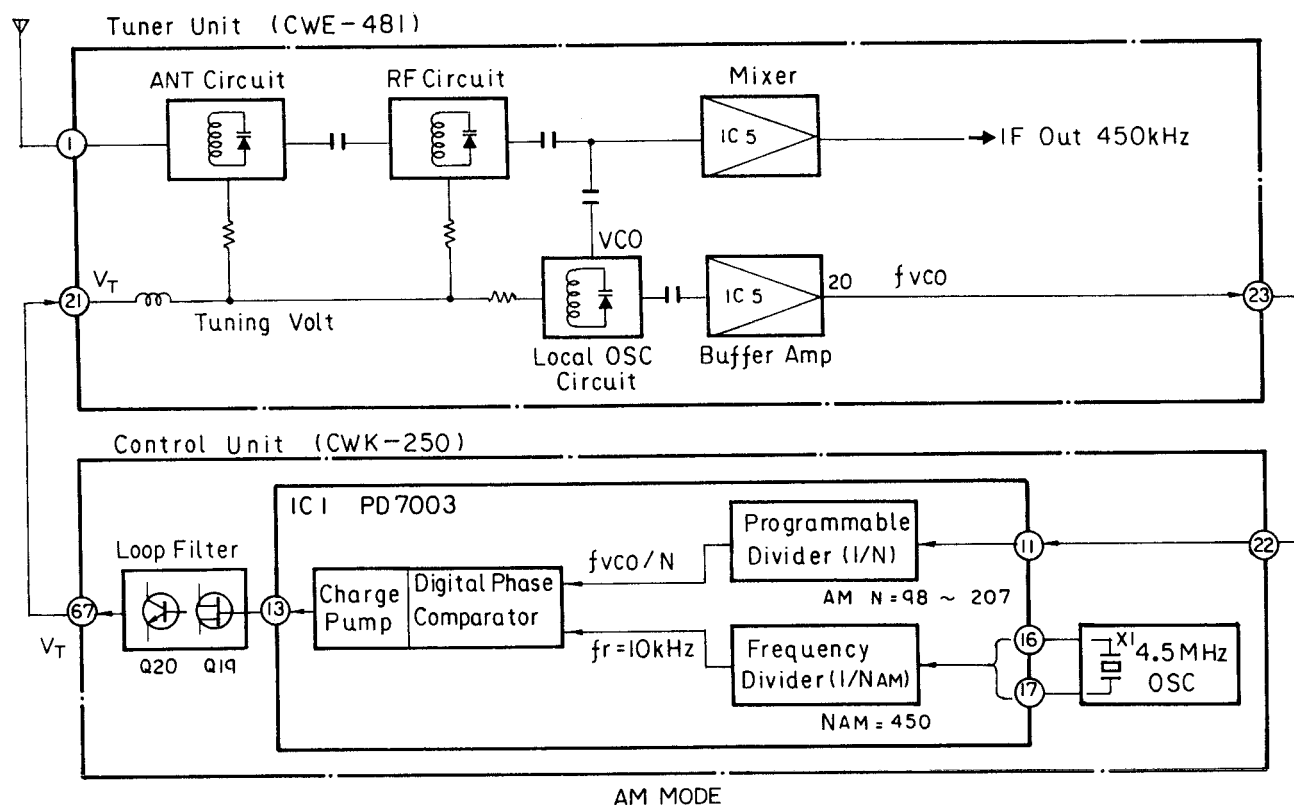


Fig. 5

• Manual Tuning and Automatic Tuning

Manual tuning can be performed using the UP key and DWN key switch matrixes. When receiving 87.9 MHz in the FM mode, the programmable divider is $N = 493$. Here, by pressing the UP key once, the UP counter counts as shown in Figure 3. Then $N = 494$ and $n = (2 \cdot N - 107) \times 100 \text{ kHz} = 88.1 \text{ MHz}$ is received and sent to channel 1. The DWN key operation is the same. If the UP or DWN keys are pressed for more than 0.5 seconds, movement will occur at a rate of approximately 10 Hz. Auto tuning can be performed using the SCAN key and SEEK key. By pushing the SCAN key once, the UP counter increases by

one and the programmable divider N become $N = N + 1$ and the receiving frequency and LED display go up one channel. At this time, if a signal at the frequency is detected, the squelch signal is output at H level from the number 19 terminal of the tuner unit and goes into the control unit and Q23 of the switch matrix comes ON and SCAN stops and goes to a receiving condition. After 5 seconds have elapsed, the SCAN operation starts again. In the case of SEEK, the SEEK operation stops when the squelch signal is detected and this condition is maintained.

• Switch Matrix

Figure 6 shows a switch matrix which is composed of the terminals of D1 to D6 and K1 to K4 of PD7003. This is installed in the front grille of the GEX-90 and enables the various operations to be performed. However, only SQ operates internally. The matrix composed of D1 to D3 and K1 to K4 is connected using the touch switches. The diodes of D18 to D23 prevent misoperation by pressing 2 touch switches. Also, D12, D17 and D25 operate in a similar manner. Next, Q23 and Q31 to Q33 are used as transistor switches and are turned on by applying the control voltage to each base. Hence, Q23 becomes SQ ON condition, Q31 becomes F1 condition, Q32 becomes RADIO ON condition

and Q33 becomes AM condition. Furthermore, digit terminals D1 to D6 (Pins 28 to 23) are active "L" and a pulse signal of 3 msec duration is output. Also, key sensing terminals K1 to K4 (Pins 22 to 19) have pull up resistance built-in and normally become HIGH (hereinafter referred to as H). For K1 to K4, when the switches come ON, the condition goes to LOW (hereinafter referred to as L) and timing is digit "L". PD7003 performs the operation which determines which key was pressed. For example, by pressing the SEEK key, K1 becomes L when D3 becomes L timing. So PD7003 determines this to be the SEEK command and the seek operation begins.

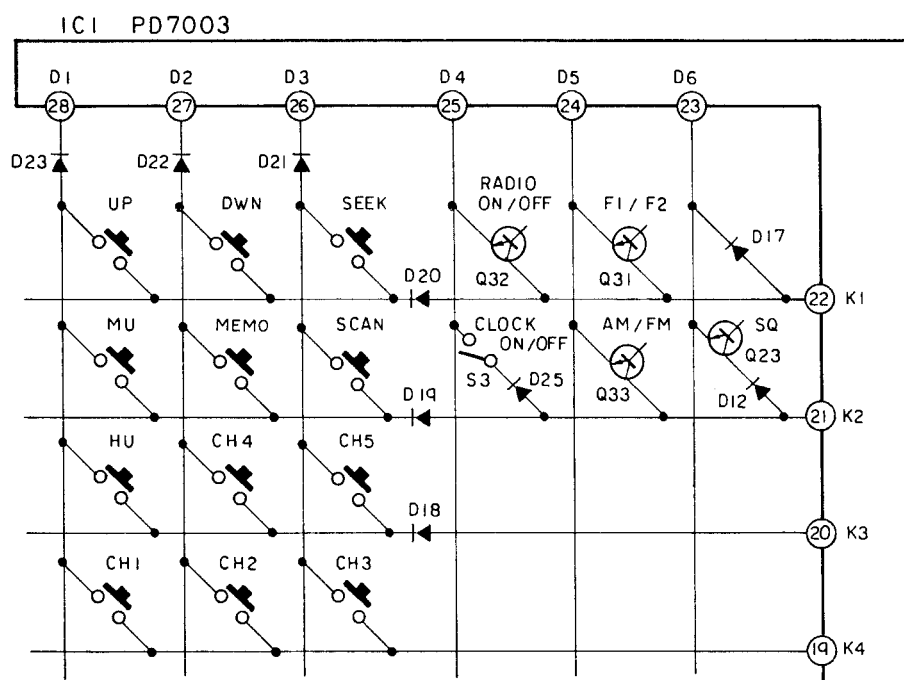


Fig. 6

• Display Control Section (Fig. 7)

The display of PD7003 is a dynamic lighting system and is synchronized with the D1 to D6 digit signals for LED illumination. Sweep is in 3 msec durations. This display can display numerals (clock display), band, CH and preset memory. The digit signal indicates the unit of the display section and units D1 to D4 sweep from units to thousands, D5 sweeps the band display and D6 sweeps the CH display. The numerical display LED is composed of 7 LEDs, such as "8" and by adding ".", this becomes an 8-segment output and is output from S1 to S8 of the IC. These digit outputs and segment outputs are synchronized and by driving respectively connected LED drivers Q25 to Q30 and IC2 + Q22, the display LEDs are illuminated. D1 to D6 are

active "L" and S1 to S8 are active "H" and LEDs are illuminated only when D1 is L and S1 is H. PNP Darlington transistors are used for digit drivers and Q25 to Q30 are ON when D1 to D6 are L. The anodes of each LED of DG1 to DG6 are commonly connected to Q25 to Q30 collectors and the cathode sides are connected to the collectors of the corresponding segment drivers (IC2 + Q22) via R65 to R72. IC2 (IR2403) is an accumulation of 7 NPN Darlington transistors. This IC2 + Q22 is ON when segment outputs S1 to S8 are H and the LEDs are illuminated. The display LED illumination timing chart is shown in Figure 8. For this condition, since D1 is L and S1 to S8 are H, the "8" of DG1 is illuminated and the sweep duration is 3 msec.

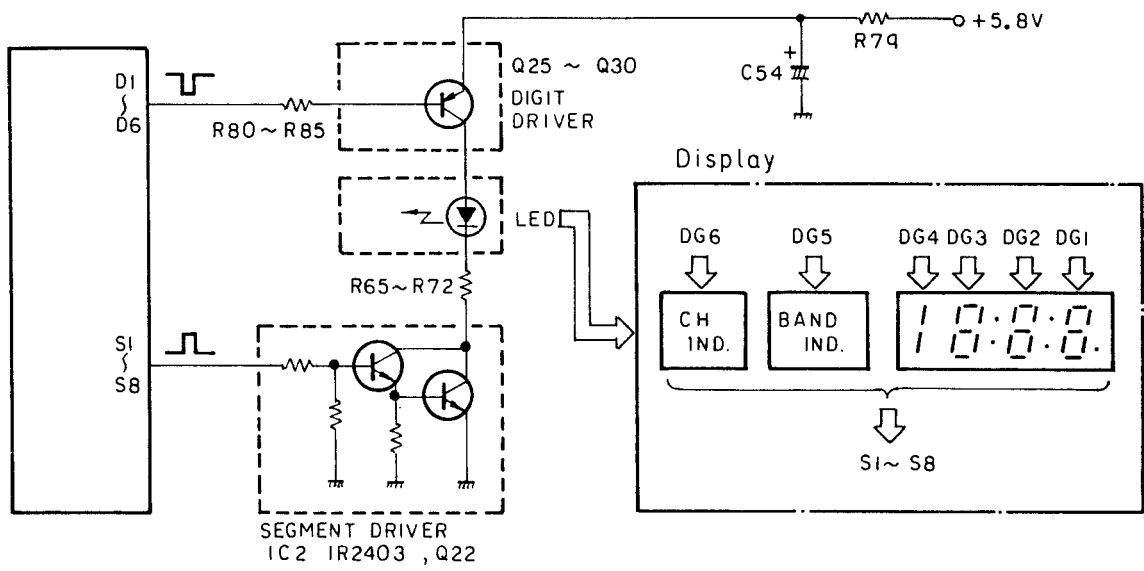


Fig. 7

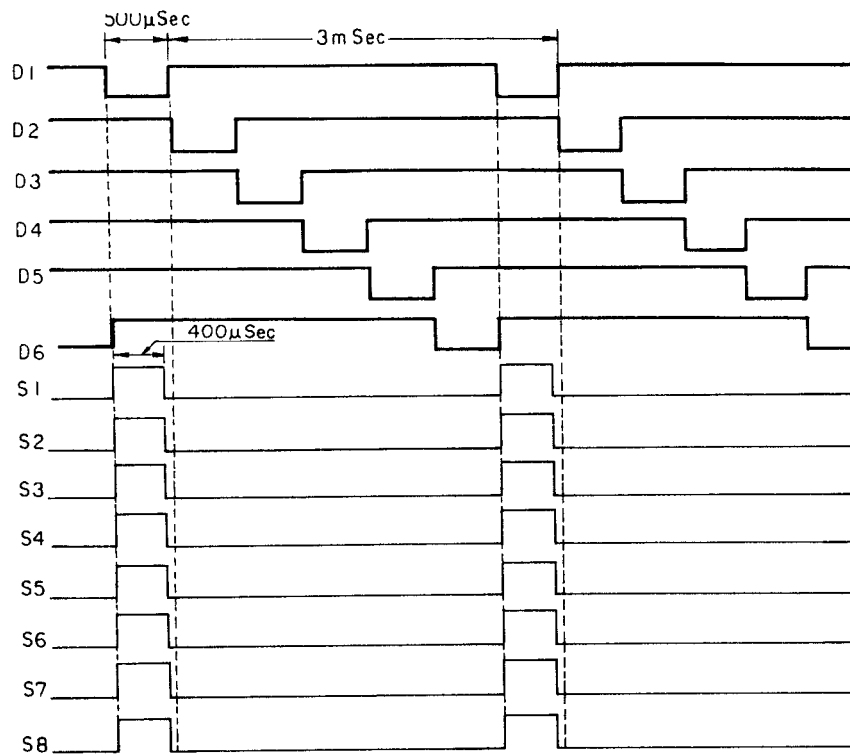


Fig. 8

• Charge Pump And Loop Filter

Figure 9 is simple circuits of the FM loop filter circuit and the charge pump. For the output signal ($f_{vco}/20$)/N of the standard frequency f_r and programmable divider, the digital phase is compared by the digital phase comparator and since that output pulse cannot be connected directly to the loop filter, it is output to the FM DO terminal as pulse data using a switching FET (charge pump) which is connected with the complimentary of the Pch MOS FET and the Nch MOS FET. This switching constitutes 3 conditions as shown in the Figure 9 charge pump and the output pulses are generated above the DC voltage (the DC bias voltage of the connected loop filter). It is a + pulse when Pch is "ON" and Nch is "OFF" and floating when both are OFF. When a - pulse is output, Q17 gradually goes OFF and the Q18 collector potential goes up and C43 and C44 are charged

and tuning voltage V_T gets higher and f_{vco} gets higher. Also, when a + pulse is output, Q17 starts coming ON and Q18 comes ON and the electric load of C43 and C44 is discharged through Q18 so that V_T gets lower and f_{vco} also gets lower. This loop filter is composed of an active filter using the time constant of C43 and R56, and the time constant of C43 + C44 and R56. Furthermore, at the first stage filters of R57 and C45, the pulse drops repeatedly close to the standard frequency and becomes nearly complete DC tuning voltage. The FM standard frequency is 5 kHz and for AM it is 10 kHz and the time constant of each active filter is different. This time constant is related to the lock up time of the PLL. Furthermore, the FM DO output pulse always repeats the above condition even for the PLL lock condition and the lock condition is maintained.

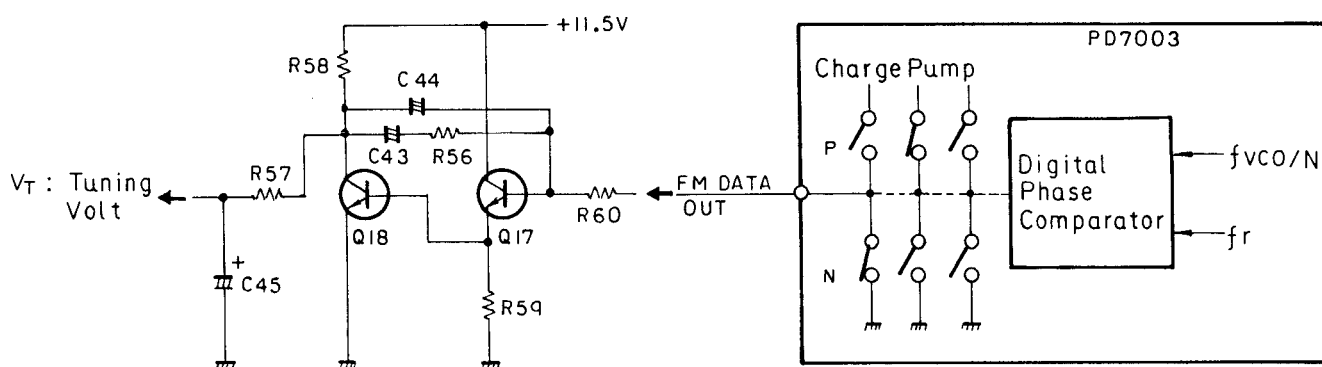


Fig. 9

• DC-DC Converter

When the battery voltage drops (below 10V), a stabilizing voltage of approximately 11V is used as the power source of the loop filter circuit for tuning voltage generation so as not to change the tuned frequency of the tuner. For this, the digit signal output from PD7003 is used as the switching signal and is composed of a voltage doubling circuit from combining the transistor switch and the electrolytic condenser and approximately 25V is made and output from a power source voltage of 13.8V and becomes the primary voltage of the stabilizing power source. Figure 10 shows the DC-DC converter circuit. D8, D9, Q13 and Q14 are switching diodes and transistors. Q13 and Q14 are operated using drive transistor Q15. The digit signal of PD7003 is applied to the base of Q15 using the OR circuit of D14 to D16. This signal is a duty 50% square wave and this turns Q15 ON

and OFF and switches Q13 and Q14. First, when Q15 is OFF, the collector becomes H and Q13 goes OFF and Q14 comes ON and C39 is charged to approximately 13V via D8 and Q14. Next, when Q15 comes ON and the collector becomes L, Q14 goes OFF and Q13 comes ON and the collector potential of Q13 becomes approximately 13.6V. Then, for the + side of C39, the charged voltage is added and becomes 26.6V and D8 is cut off and D9 comes ON and C40 is charged by the lowered V_F amount (0.7V) of voltage of D9. By repeating this operation, a voltage of approximately 25V is obtained. The reason why this voltage does not simply become twice the voltage of 13.8V is due to the consumption at R50 and the amount of loss at Q13, Q14, D8 and D9.

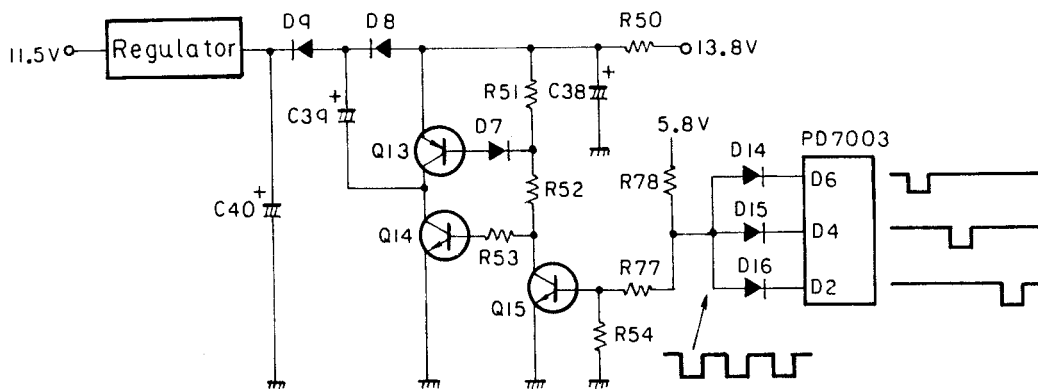


Fig. 10

• Muting Control

A muting signal is output from PD7003 during power ON and OFF, UP/DOWN and SCAN and SEEK station selection, preset station selection and band switching operations.

1.3 POWER CIRCUIT

• Power Amp

The power supply of the connected power amp is switched by Q45. Then Q46, which is connected to the base of Q45, is switched by tuner power switch S1 or by the power supply of the connected deck so that the power amp comes ON and goes OFF as Q45 comes ON and goes OFF.

• Tuner/Deck Switch

The power supply of the GEX-90 tuner circuit and audio circuit is switched and supplied by Q42 and Q43 as shown in Figure 11. When tuner power switch S1 is ON, Q43 comes ON and Q42 comes ON. Here, if the deck is turned ON, Q44 comes ON and Q43 goes OFF using deck + B and Q42 goes OFF and the deck is switched.

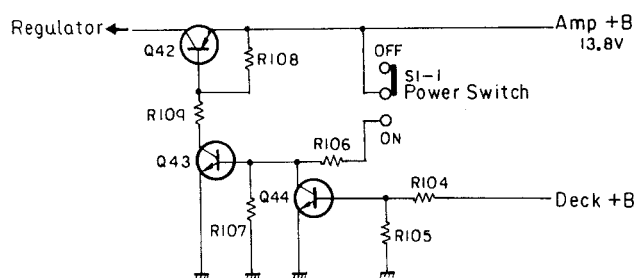


Fig. 11

• 8.5V Regulator

The 8.5V stabilized power supply of differential stage 1, which is composed of Q40, Q41 and D27 as the power supply of the tuner circuit and the audio circuit, provides a stabilized, highly accurate, high ripple repressed power supply.

• FM/AM Switching

Power supply switching of the FM/AM tuner circuit is composed using the transistor switching circuit which is formed by Q37 to Q39 and is switched by the control voltage using band selector S7. When S7 is in the F1 and F2 positions, since Q39 is OFF, Q38 is also OFF and the collector potential is at the L level. Therefore, Q37 comes ON and power is supplied to the FM tuner circuit. Using this FM + B, the prescaler of the PLL controller and the ST indicator become operational. Next, when S7 is in the AM position, Q39 comes ON and Q38 also comes ON and power is supplied to the AM tuner circuit and at the same time, since the base potential of Q37 becomes nearly equal to the emitter potential, Q37 goes OFF and FM + B is not supplied.

• 5.7V Regulator

The power supply of the PLL controller is a stabilized power supply which is composed of Q47 and D31 and supplies PD7003 and the display LEDs, etc. This power supply can operate when the tuner operates or the connected deck operates. This is in order for the clock display to be able to function even when the deck is operating. Also, even when the above regulator is in an OFF condition, the power supply of PD7003 operates in order to preserve the memory which is a function of the IC and to make the clock operate and is stabilized and backed up by using zener diode D34 of the 5.1V from the battery.

1.4 AUDIO CIRCUIT

• Signal Route

The audio signal output from AM/FM is switched using the diode switch circuit and the desired signal is output to the next stage. This signal is input to an NF type tone control circuit formed by VR1 and VR2 and operational amp IC4 via control unit buffer amps Q1 and Q2 and that output goes through volume, loudness circuit and balance volume and is amplified using 1-element flat amps Q3 and Q4 and is input to IC5. The connected deck's signal is input to this IC5 and the tuner/deck switching functions are built-in. Furthermore, concerning the output of IC5, the signal and ground are separated using line trans T1 and T2 and this becomes the tuner output. This line trans output is connected to the muting circuit formed by Q7 to Q10 when the deck is ON/OFF and the audio attenuator which is switched using Q11 and Q12.

• Tuner Muting Circuit

Figure 12 shows the tuner muting circuit. Q5 and Q6 are muting transistors and come ON and go OFF using the output voltage of Q21. This Q21 is controlled by the muting terminal (Pin 9) of PD7003 and a muting signal is output and causes muting during tuner ON/OFF, UP/DWN station selection, SCAN/SEEK station selection, preset station selection and band switching. Also, the line which is connected from the base of Q5 and Q6 through C37 is used to cause muting when the power switch is OFF. Here, when the power switch goes from ON to OFF, +B is applied to the switch side of R48 and muting is performed whenever voltage is applied to C37.

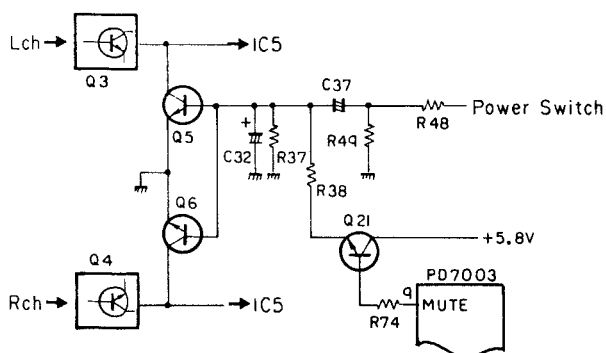


Fig. 12

• Tuner/Deck Switching Circuit

Figure 13 shows one channel of the IC 5 internal circuit. Tr 1 is the input circuit of the tuner side and Tr 2 is the input circuit of the deck side and switching is performed using the circuit which is directly connected to the collector of the fixed bias circuit formed by Tr 1 and Tr 2. Then the signal of the tuner or deck is output from the collector, goes through emitter follower Tr 3 and is output using low impedance. Since the power supply of this circuit is taken from AMP SWD + B, the C and R 2-stage filter is used to remove the ripple portion. The tuner/deck switching operation is not done like relays in the past but the signal from the tuner or deck is output via Tr 1 to Tr3. Therefore, signal switching is performed by switching the power supply of the tuner/deck.

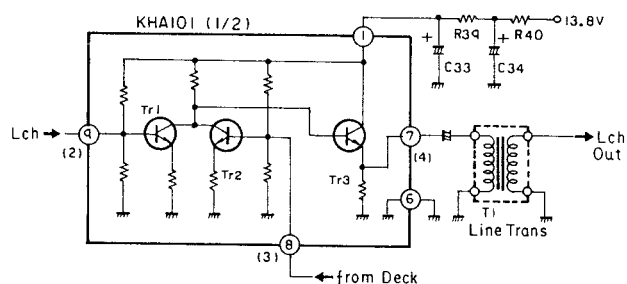


Fig. 13

• Line Trans

Line trans (T1 and T2) separate the signal and ground and prevent common mode noise caused by two grounding points.

• Deck ON/OFF Muting Circuit

This circuit prevents noise when the deck is turned ON/OFF and the PNP and NPN transistors are used as shown in Figure 14. First, when the deck is ON, whenever Q9 and Q10 are ON as a result of voltage increase when C35 is charged, muting occurs. After that, whenever the deck is ON, muting is not performed because the minus terminal of C35 is 0 potential. Furthermore, when the deck is OFF, DECK SWD + B gets lower and as soon as the voltage of zener diode D4 gets lower than the zener voltage,

C35 begins to discharge and the potential of the minus terminal becomes a negative potential and Q7 and Q8 base current is withdrawn through D2 and causes muting. This muting is for a short interval. Here, D2 is used to protect Q7 and Q8, D3 is used to increase the discharge time of C35 and D4 is a 7.4V zener diode and prevents a muting circuit error as a result of a momentary drop of power supply voltage.

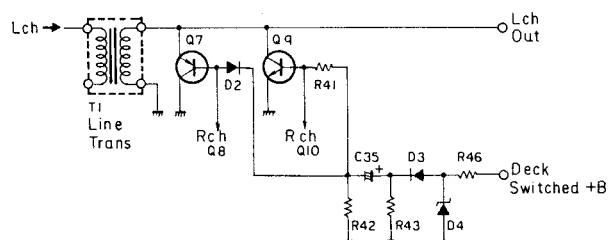


Fig.14

• Level Diagram

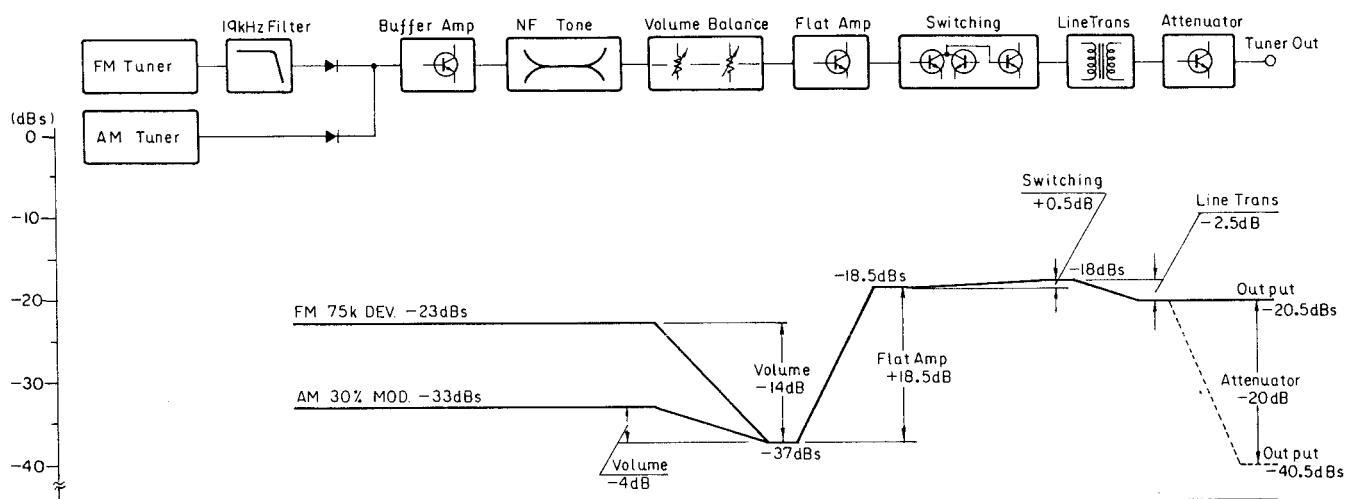


Fig. 15

2. PARTS LOCATION

NOTE

- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ : GENERALLY MOVES FASTER THAN ★.

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

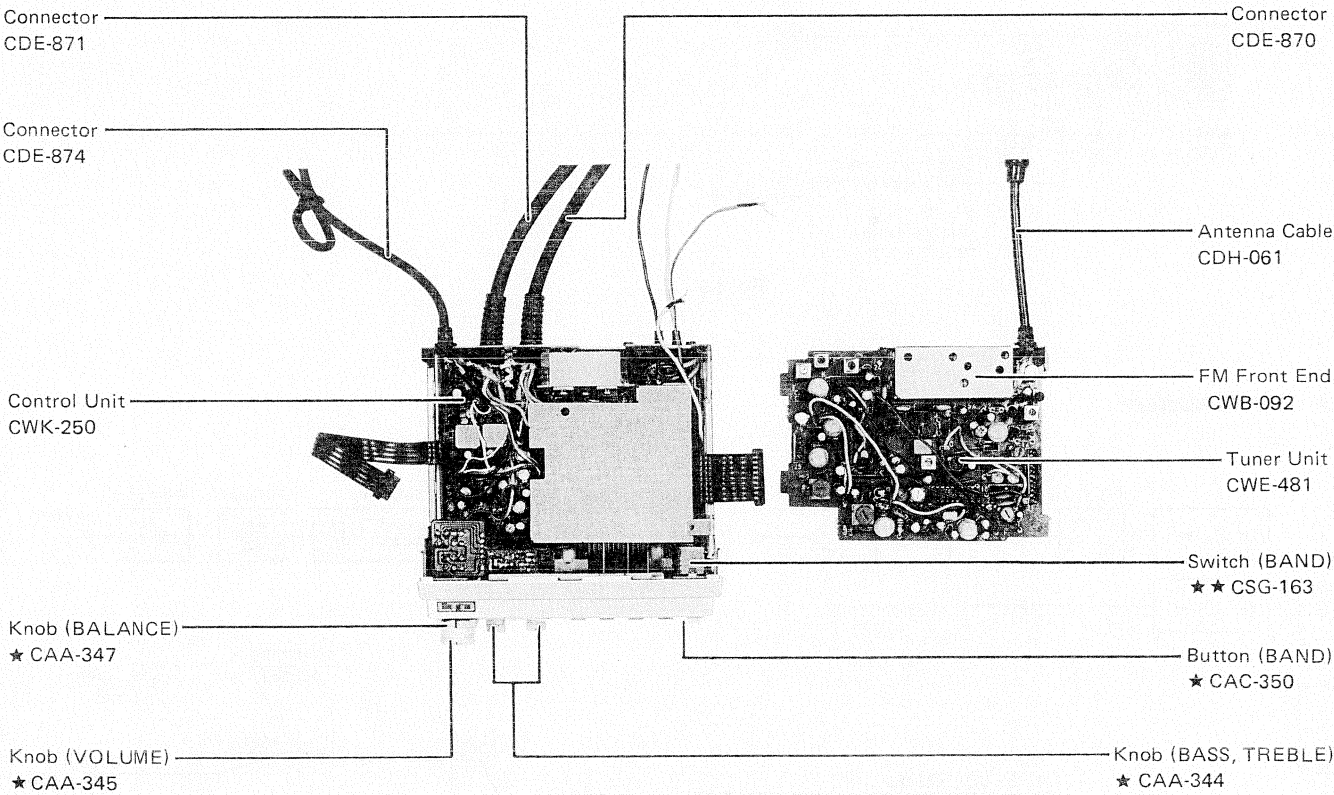


Fig. 16

3. ADJUSTMENT

3.1 FM IF ADJUSTMENT

• Connection Diagram

Switch position

Mono ON

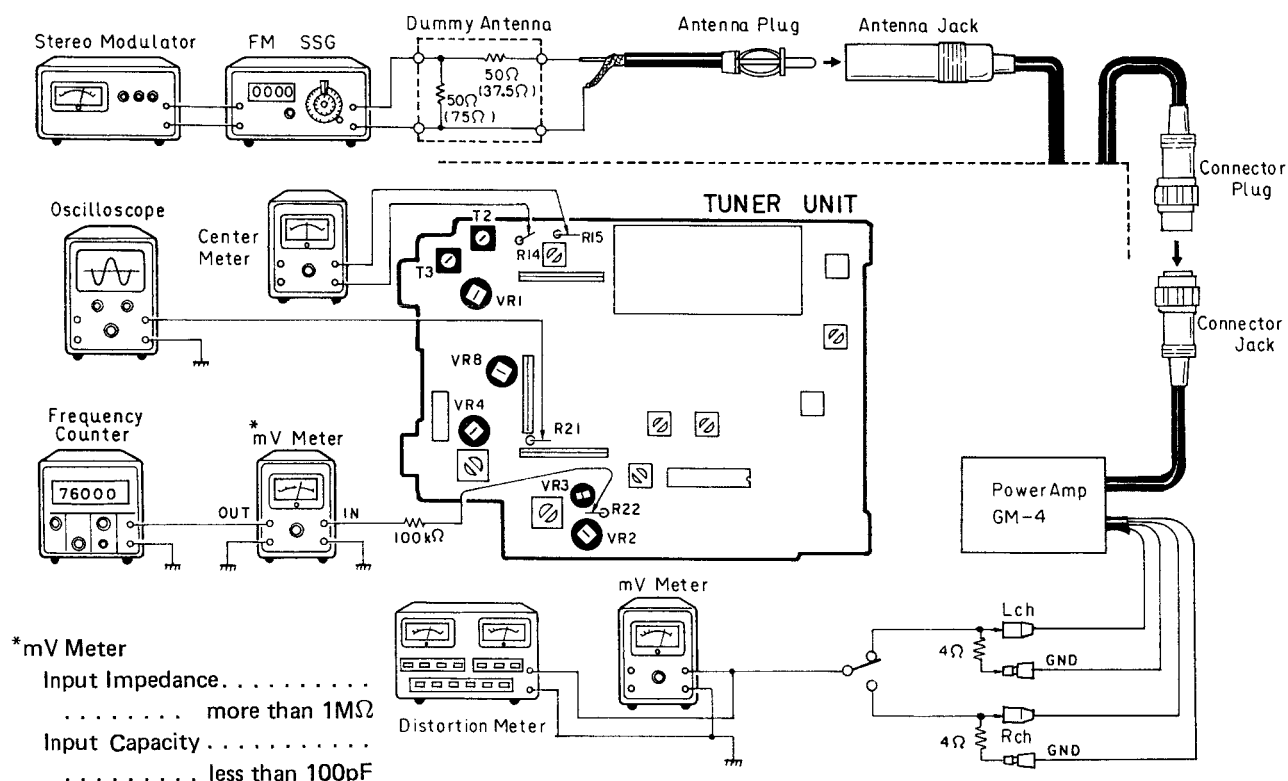


Fig. 17

• To Adjust

1. Apply a signal of 98.1 MHz, 400 Hz 100% modulation and 60 dB (μV) from the FM SSG and tune 98.1 MHz.
2. Adjust T2 to make the center meter show 0.
3. Adjust T3 to achieve minimum distortion.

3.2 AUTO LEVEL ADJUSTMENT

• Connection Diagram (Shown in Fig. 17)

Switch position

Mono OFF

• To Adjust

1. Apply a signal of 98.1 MHz, 400 Hz 100% modulation and 60 dB (μV) from the FM SSG and tune to 98.1 MHz.
2. Make the input signal 15 dB (μV) and adjust VR1 to make the mV meter show -3dB (standard output when input is 60 dB (μV)).

3.3 FM MPX ADJUSTMENT

• Connection Diagram (Shown in Fig. 17)

Switch position

Mono OFF

• To Adjust

1. Adjust VR3 to make the frequency counter show 76 kHz ±120 Hz by applying an unmodulated signal of 98.1 MHz and 60 dB (μV) from the FM SSG.
2. Adjust VR8 to reduce the oscilloscope wave to the minimum using only the modulation for the pilot signal (10%) and 60 dB (μV).
3. Adjust VR4 to obtain the best separation by applying a stereo signal (1 kHz, 100% modulation). (At this time, VR2 is turned in a clockwise direction.)
4. Adjust VR2 to obtain a 5 dB separation by making the input signal 20 dB (μV).

3.4 FM TRACKING ADJUSTMENT

• Connection Diagram

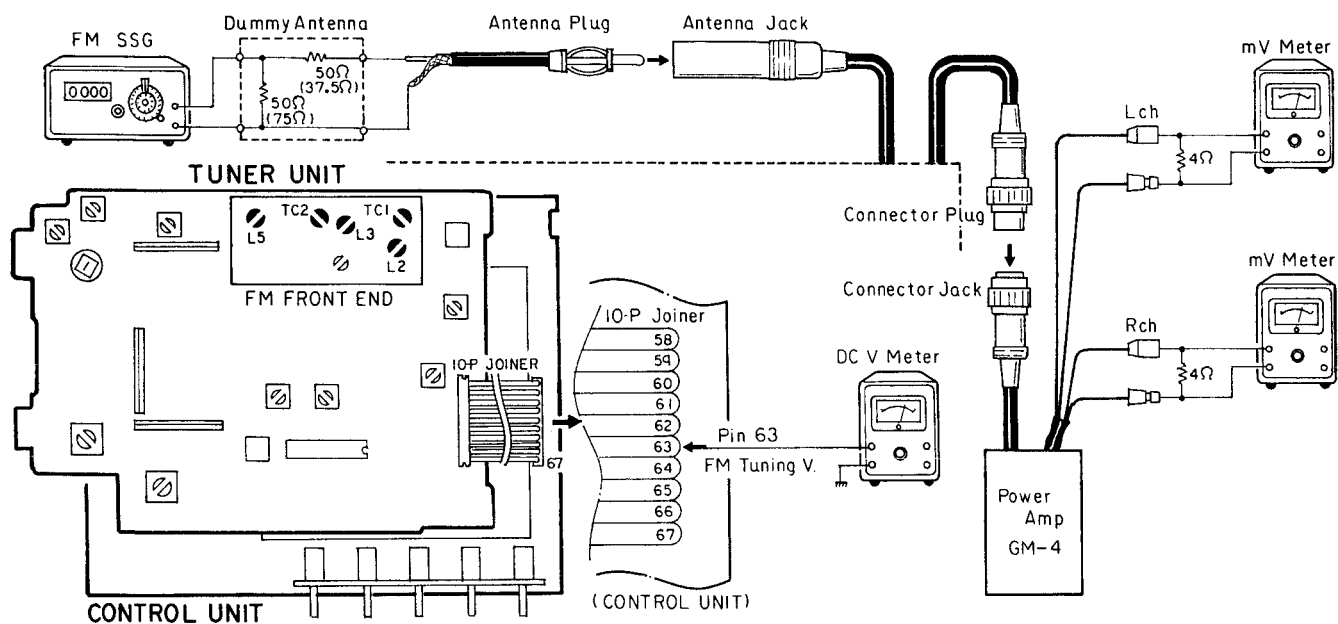


Fig. 18

• To Adjust

Frequency of FM SSG	Displayed Frequency	Adjusting Point	DC V Meter	mV Meter
	107.9 MHz	L5	$8.8^{+0}_{-0.3}$ V	
	87.9 MHz	For Confirmation Only	3.0 ± 0.5 V	
3. 89.9 MHz (400 Hz, 100% modulation) output level 10 dB (μ V)	89.9 MHz	L2, L3		Maximum output
4. 106.1 MHz (400 Hz, 100% modulation) output level 10 dB (μ V)	106.1 MHz	TC1, TC2		Maximum output
5. Repeat items (3) and (4) alternately so that the mV meter indicates maximum output.				

3.5 FM STOP SENSITIVITY ADJUSTMENT

• Connection Diagram

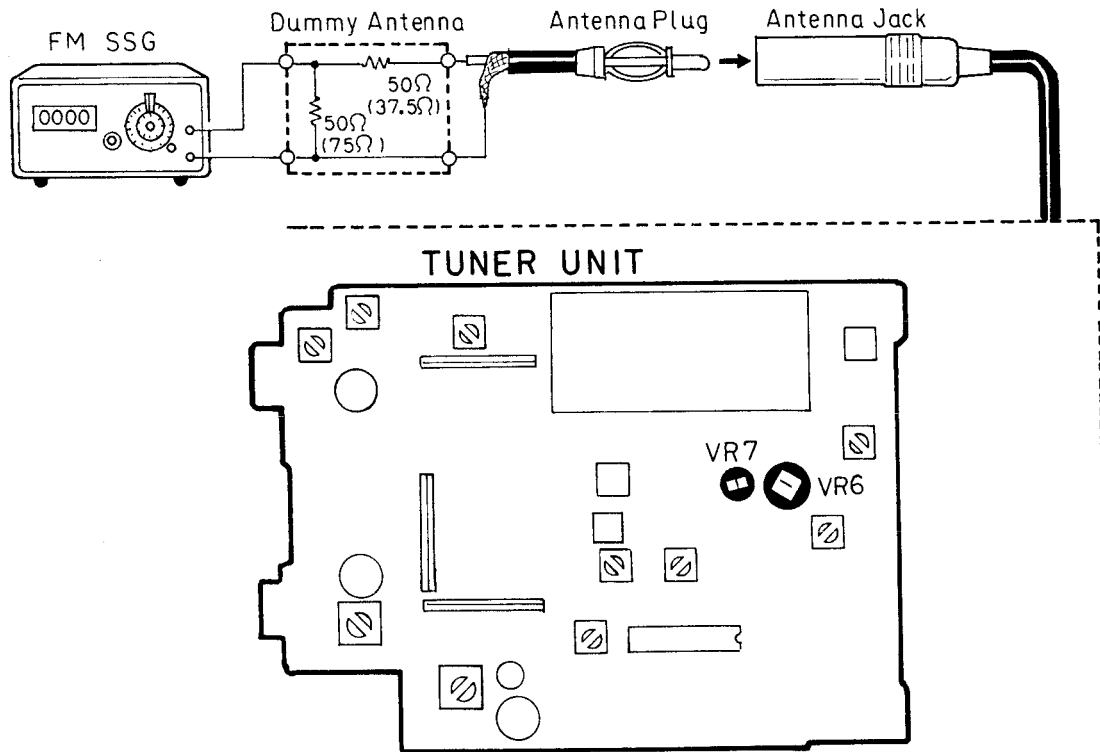


Fig. 19

• To Adjust

1. Turn the LOC.S switch OFF.
2. Apply a signal of 98 MHz, 400 Hz 30% modulation and 25 dB (μ V) from the FM SSG, scan and adjust VR7 to make the scan stop at 98 MHz.
3. Turn the LOC.S switch ON and make the input signal 45 dB (μ V).
4. Scan and adjust VR6 to make the scan stop at 98 MHz.
5. After adjustment, confirm that the scan has stopped within ± 4 dB (μ V). (Note: Scans should be performed 1 MHz apart.)

3.6 AM IF ADJUSTMENT

• Connection Diagram

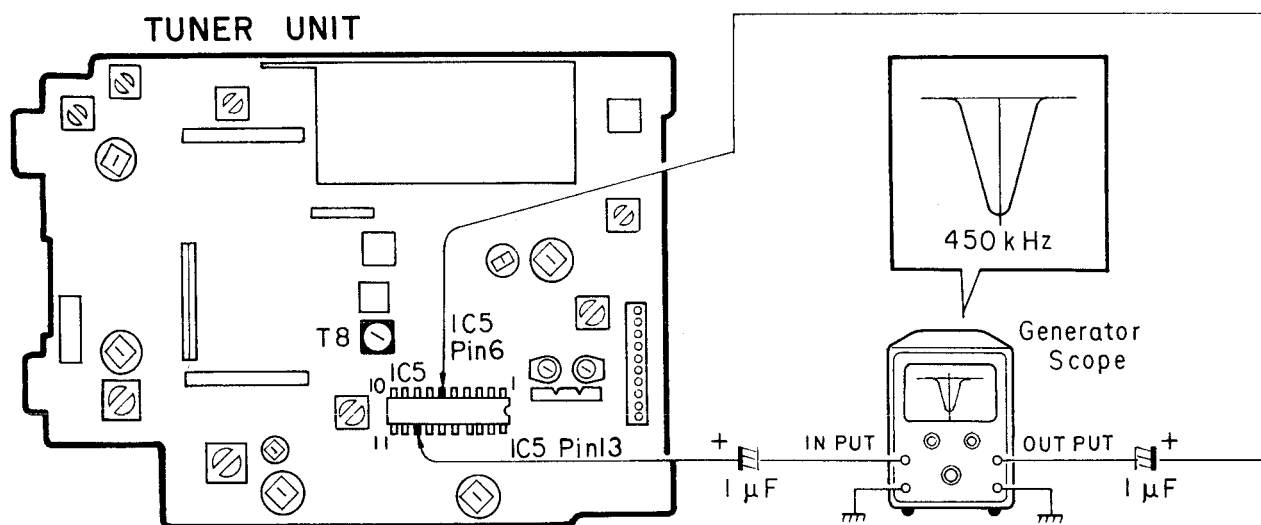


Fig. 20

• To Adjust

1. Set the input the Generator scope to the range within which the U curve can be verified and move the coil of T8 until the U curve is adjusted to its maximum amplitude and optimum symmetry.

3.7 AM TRACKING ADJUSTMENT

• Connection Diagram

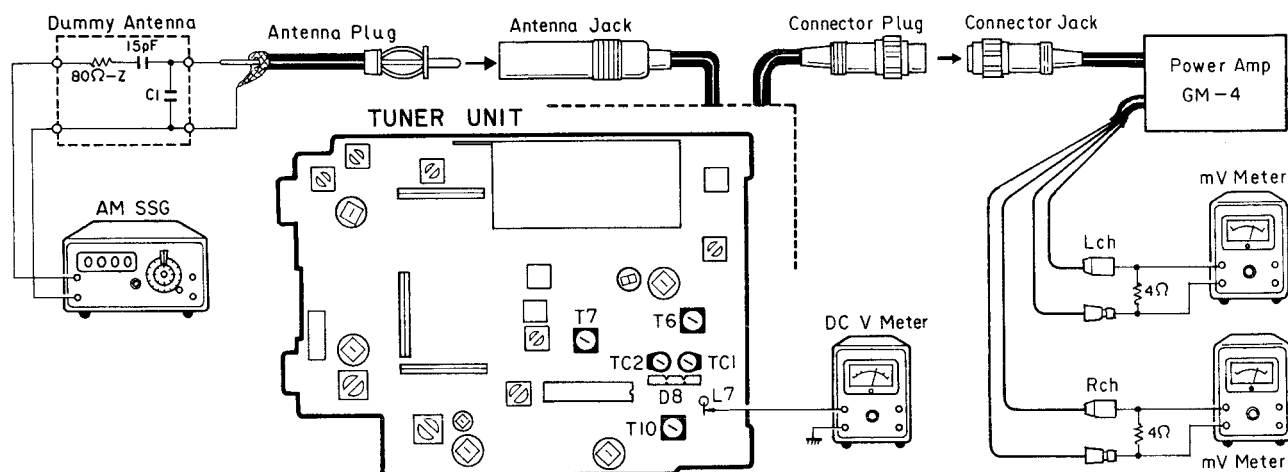


Fig. 21

NOTICE:

Select C1 so that total capacity of 80 pF is attained from the direction of receiver jack.

Z: Output impedance of the S.S.G.

• To Adjust

During tuning voltage adjustment of 531 kHz, pay attention to the voltage difference using the color mark of D8 (KV1235).

Frequency of AM SSG	Displayed Frequency	Adjusting Point	Color of D8	DC V Meter	mV Meter
1.	531 kHz	T10	Pink	$0.9 \pm 0.05V$	
			Colorless	$1.0 \pm 0.05V$	
			Blue	$1.1 \pm 0.05V$	
			White	$1.2 \pm 0.05V$	
2.	1,620 kHz	For Confirmation Only	$8 \pm 1V$		
3. 603 kHz (400Hz, 30% modulation) output level 30 dB (μV)	603 kHz	T6, T7			Maximum output
4. 1,395kHz (400Hz, 30% modulation) output level 30 dB (μV)	1,395 kHz	TC1, TC2			Maximum output
5. Repeat items (3) and (4) alternately so that the mV meter indicates maximum output.					

3.8 AM STOP SENSITIVITY ADJUSTMENT

• Connection Diagram

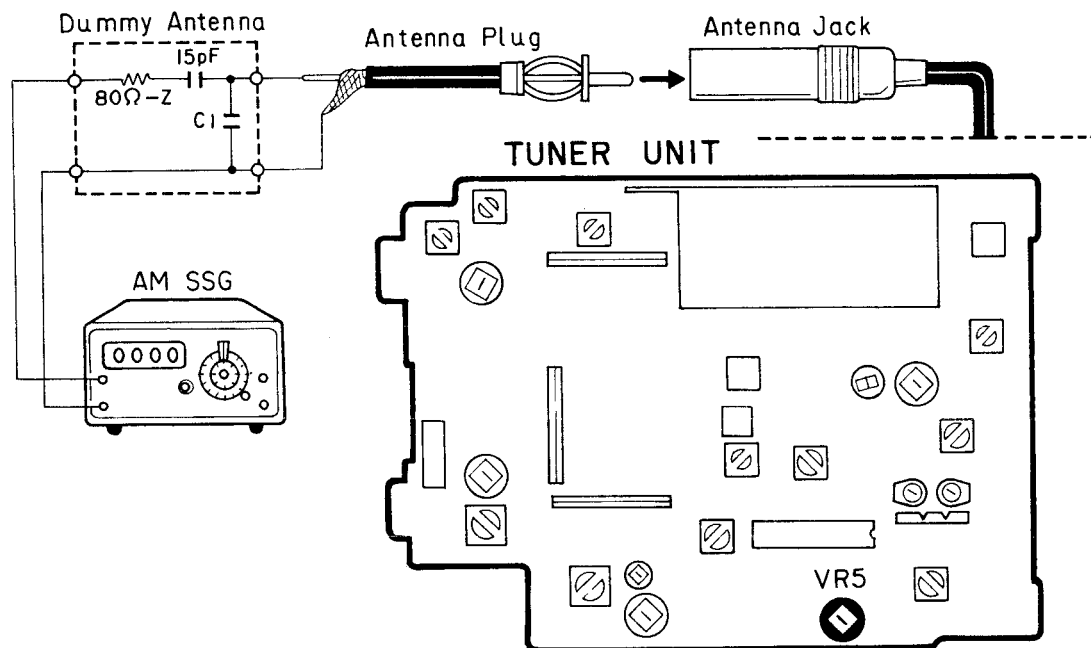


Fig. 22

NOTICE:

Select C1 so that total capacity of 80 pF is attained from the direction of receiver jack.

Z: Output impedance of the S.S.G.

• To Adjust

1. Turn the LOC.S switch OFF.
2. Apply a signal of 1,000 kHz, 400 Hz 30% modulation and 28 dB (μ V) from the SSG, scan and adjust VR5 to make the scan stop at 1,000 kHz.
3. Confirm that the scan has stopped at 28 ± 4 dB (μ V).
4. Turn the LOC.S switch ON and confirm that the scan has stopped at 46 ± 8 dB (μ V).

• IC's and Transistors

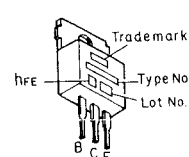
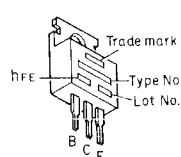
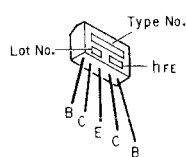
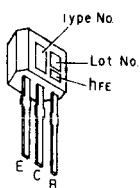
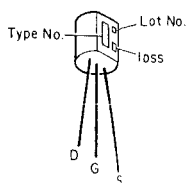
2SK163

2SC536SP

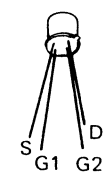
2SC1583

2SB762

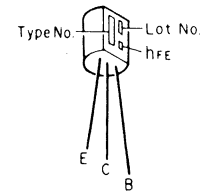
2SB707



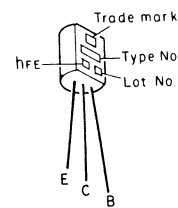
P001



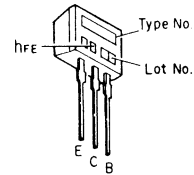
2SA1015
2SC945
2SC1674
2SC1675
2SC1815



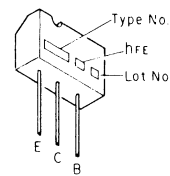
2SA720
2SC1318



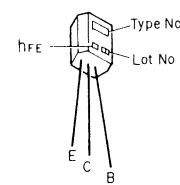
2SA1175
2SC2785
2SC2786



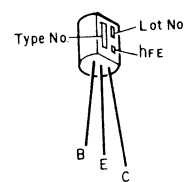
2SA790
2SC1545



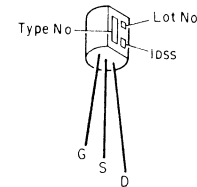
2SA1048
2SC2458



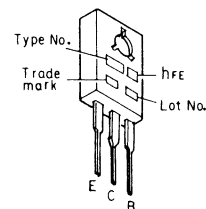
2SC2570



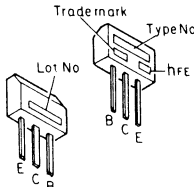
2SK49



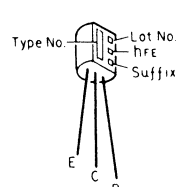
2SD882



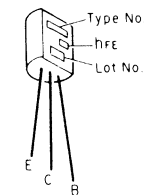
2SA673A
2SC1213



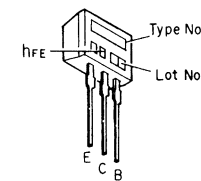
2SA733



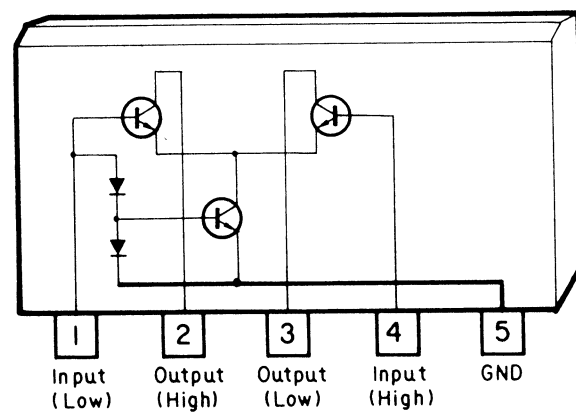
2SB562
2SD468
2SD655



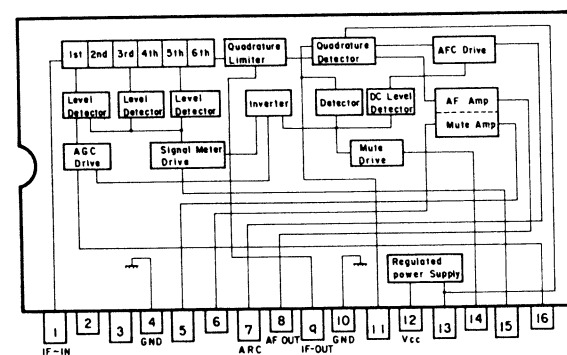
2SC2787



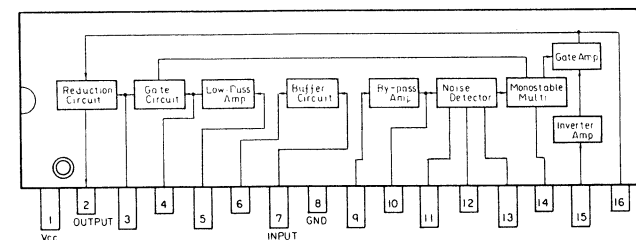
M5215L



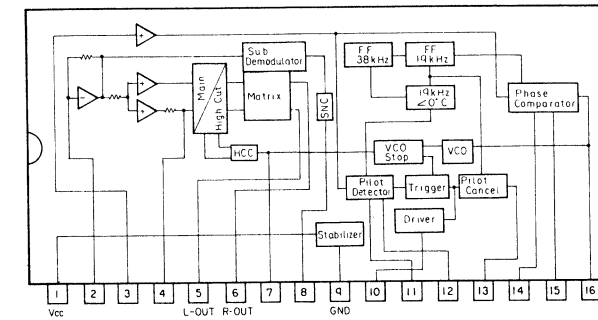
LA1140



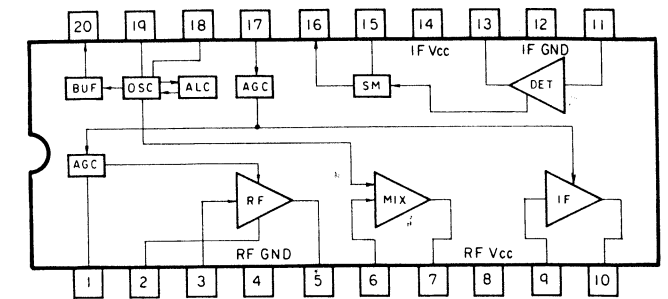
LA2110



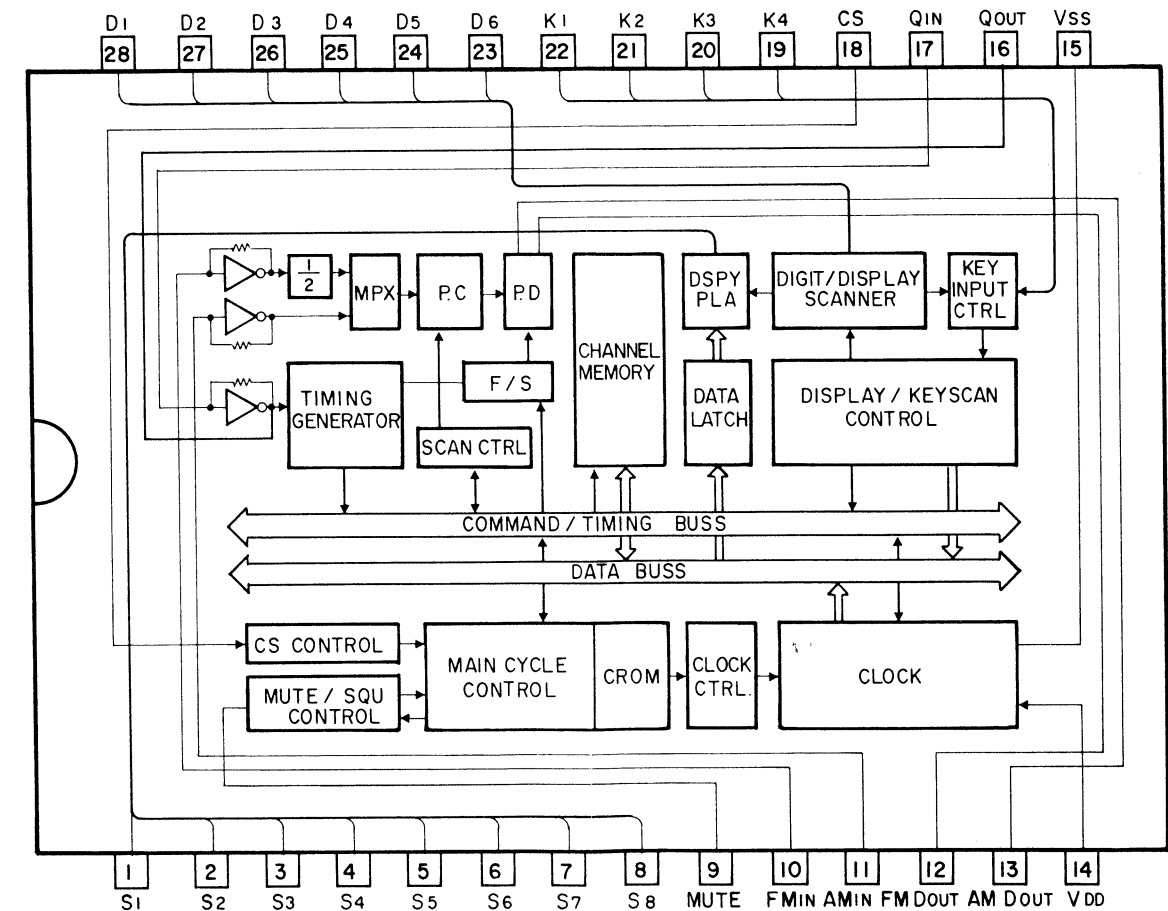
LA3375



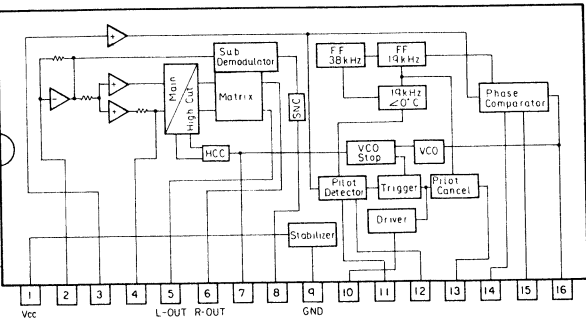
LA1245



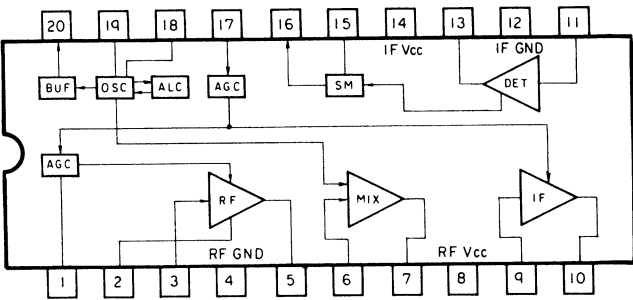
PD7003



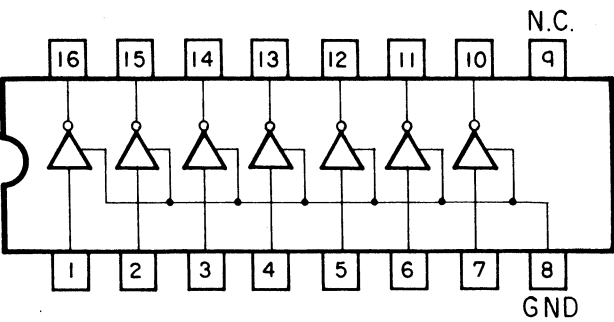
LA3375



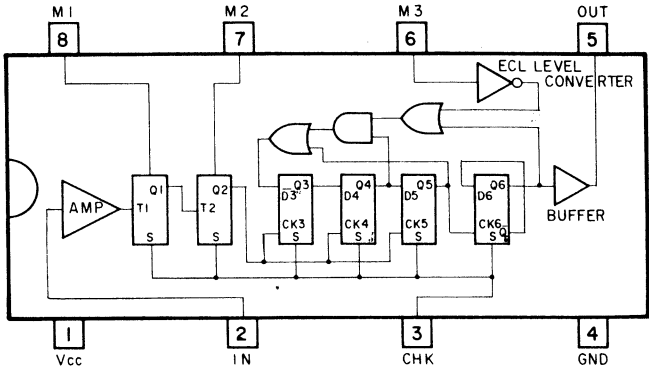
LA1245



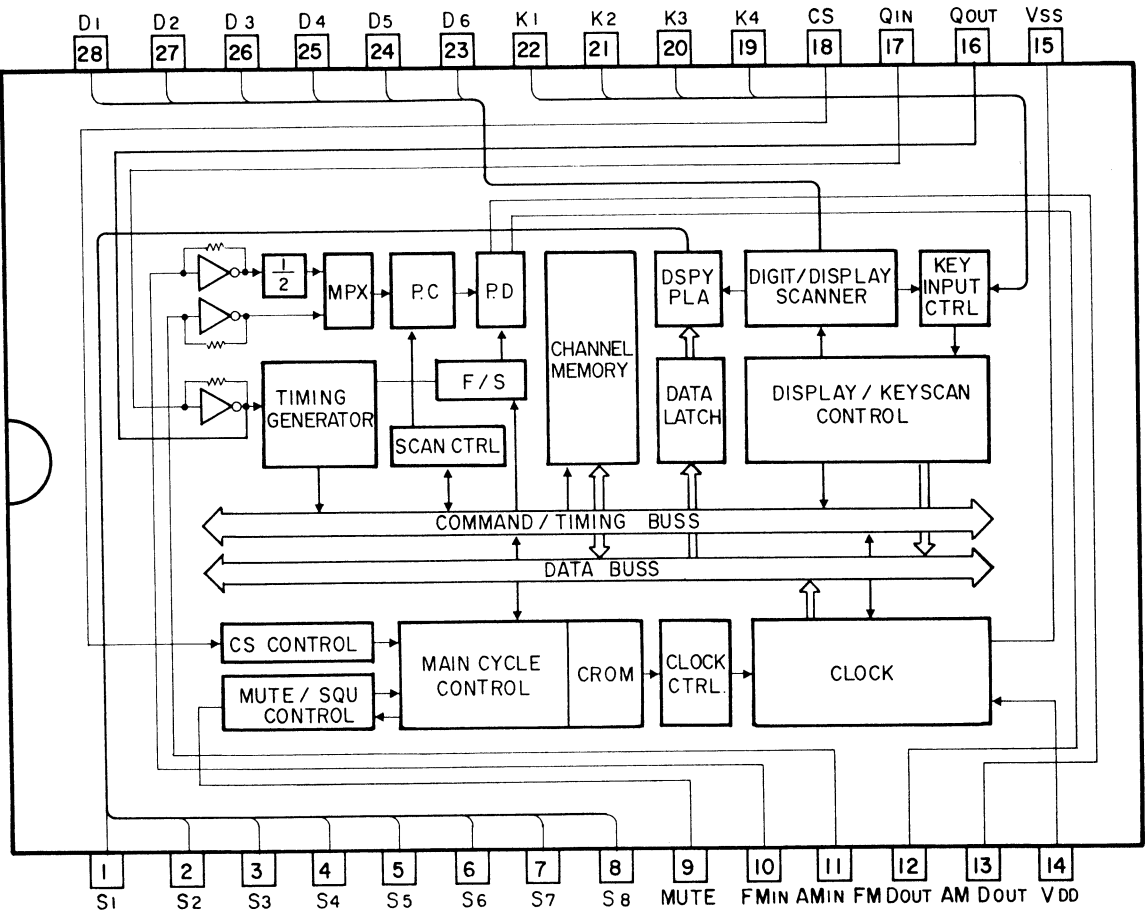
IR2403



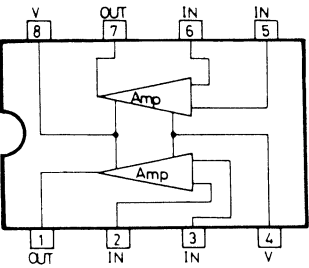
μPB552C



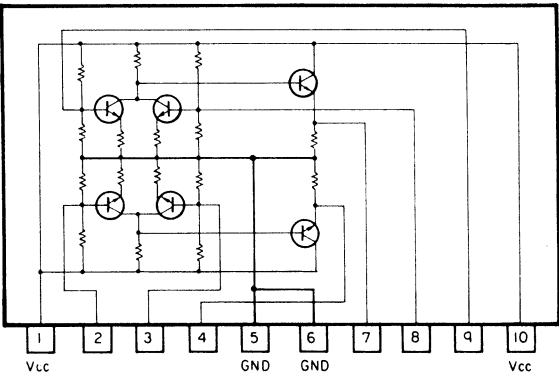
PD7003



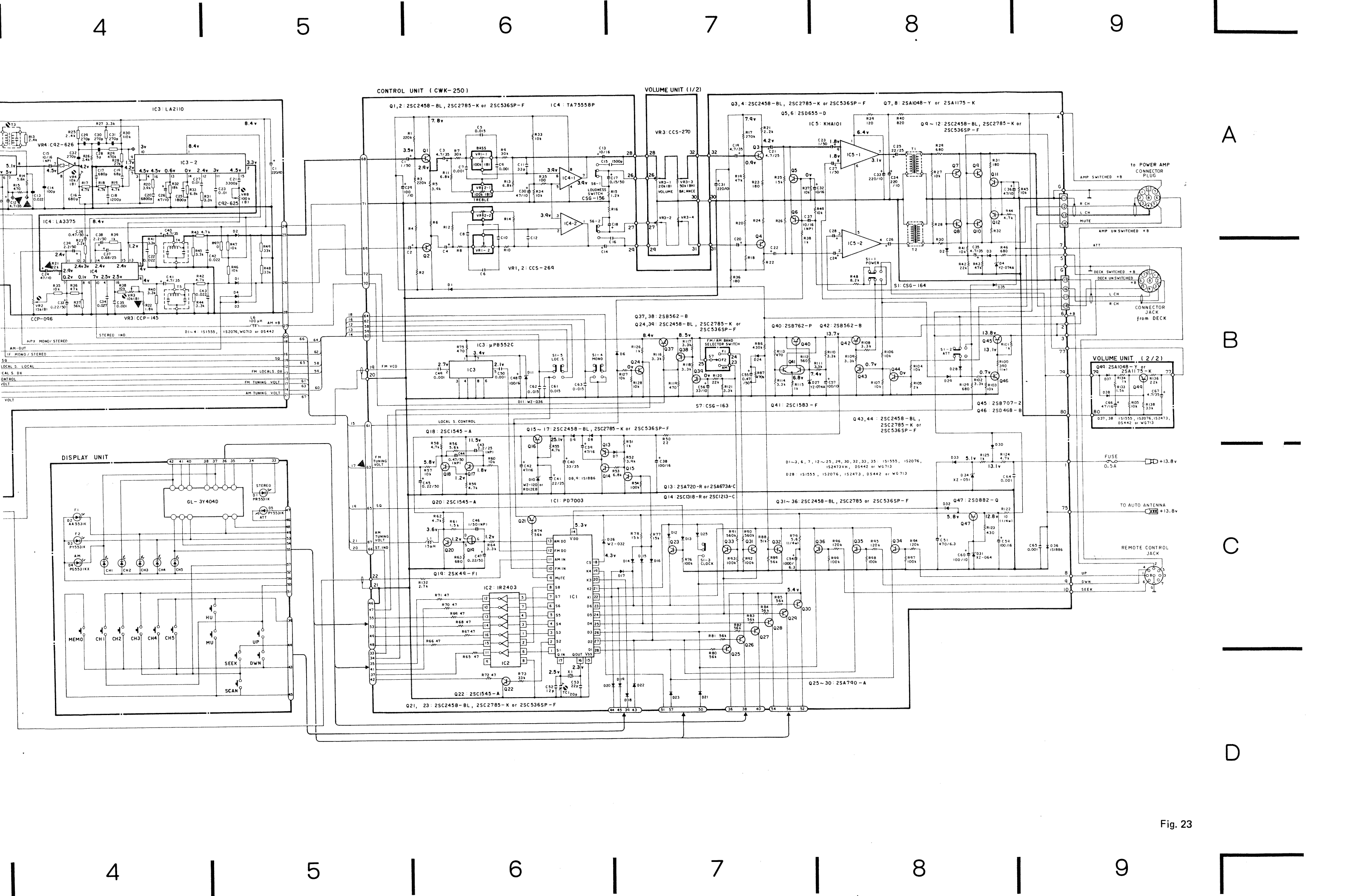
TA75558P



KHA101



6



D



Fig. 24

6. CABINET EXPLODED VIEW

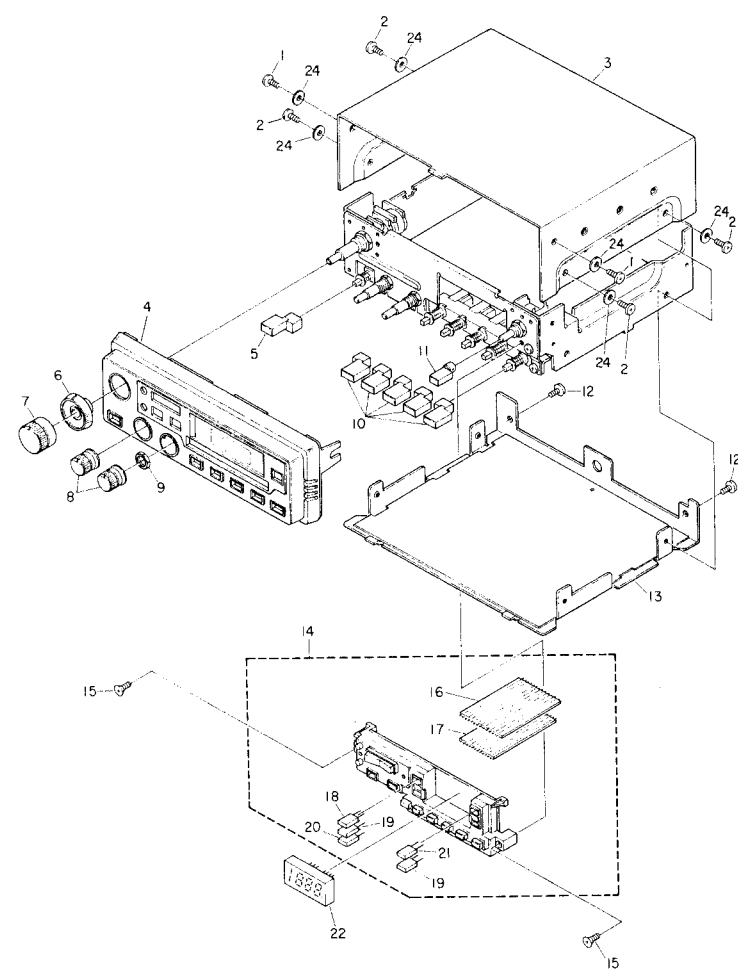
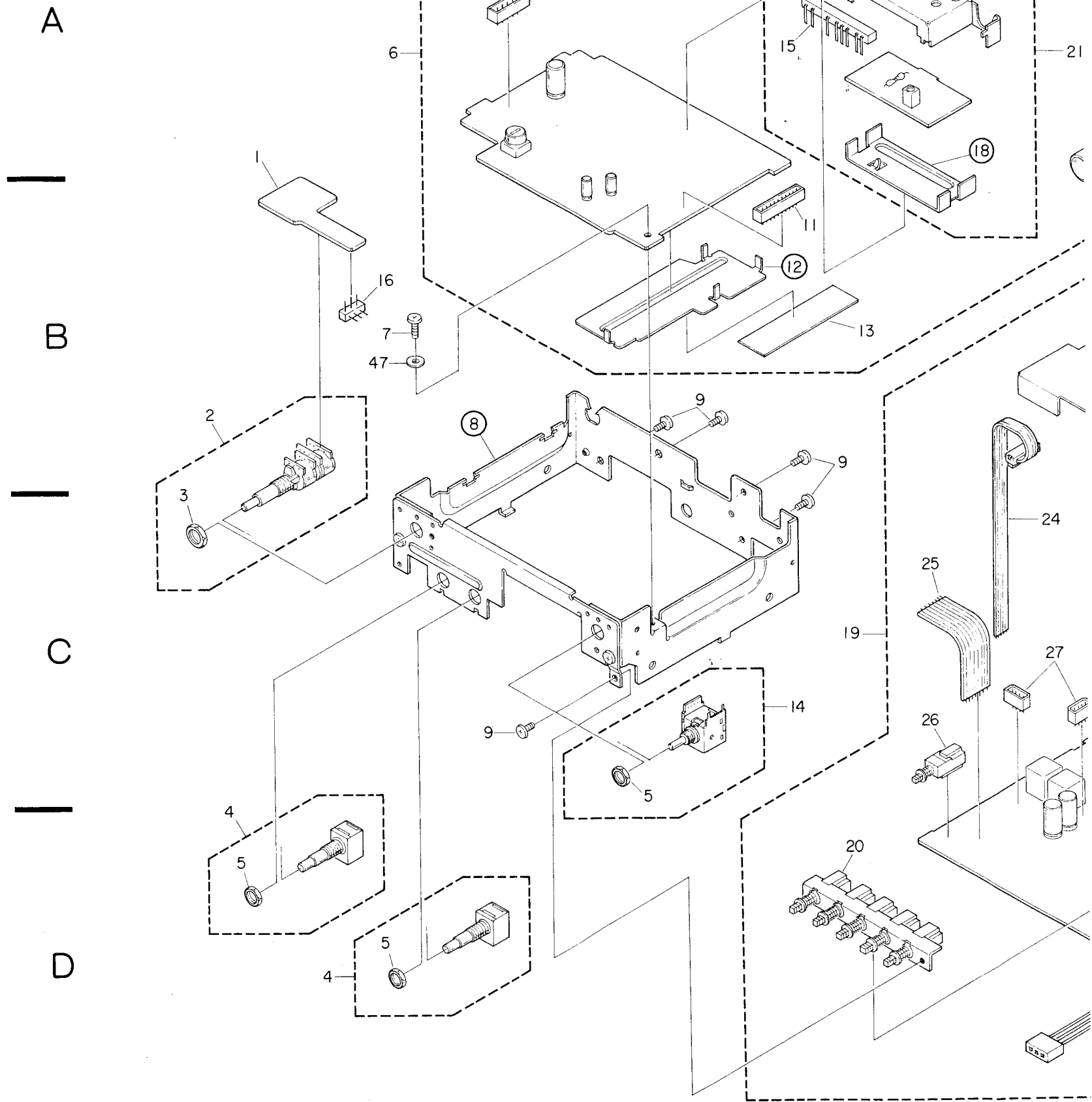


Fig. 25

• Parts List

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	BMZ30P080FBK	Screw		16.	CDE-869	Connector (13P)
	2.	BMZ30P060FBK	Screw		17.	CDE-868	Connector (12P)
	3.	CXC-343	Case Unit	★	18.	AA5531K	LED
	4.	CXC-346	Grille Assy	★	19.	PY5531K	LED
★	5.	CAC-349	Button (LOUDNESS)	★	20.	PG5531KX	LED
★	6.	CAA-347	Knob (BALANCE)	★	21.	PR5531K	LED
★	7.	CAA-345	Knob (VOLUME)	★	22.	GL-3Y404D	LED
★	8.	CAA-344	Knob (BASS, TREBLE)		23.	VACANT	
★	9.	NK60FUC	Nut		24.	WA32D060D50	Washer
★	10.	CAC-348	Button				
★	11.	CAC-350	Button (BAND)				
	12.	BMZ30P040FMC	Screw				
	13.	CXC-344	Case Unit				
★★	14.	CWS-105	Switch Unit				
	15.	CMZ26P140FMC	Screw				

7. CHASSIS EXPLODED VIEW



7. CHASSIS EXPLODED VIEW

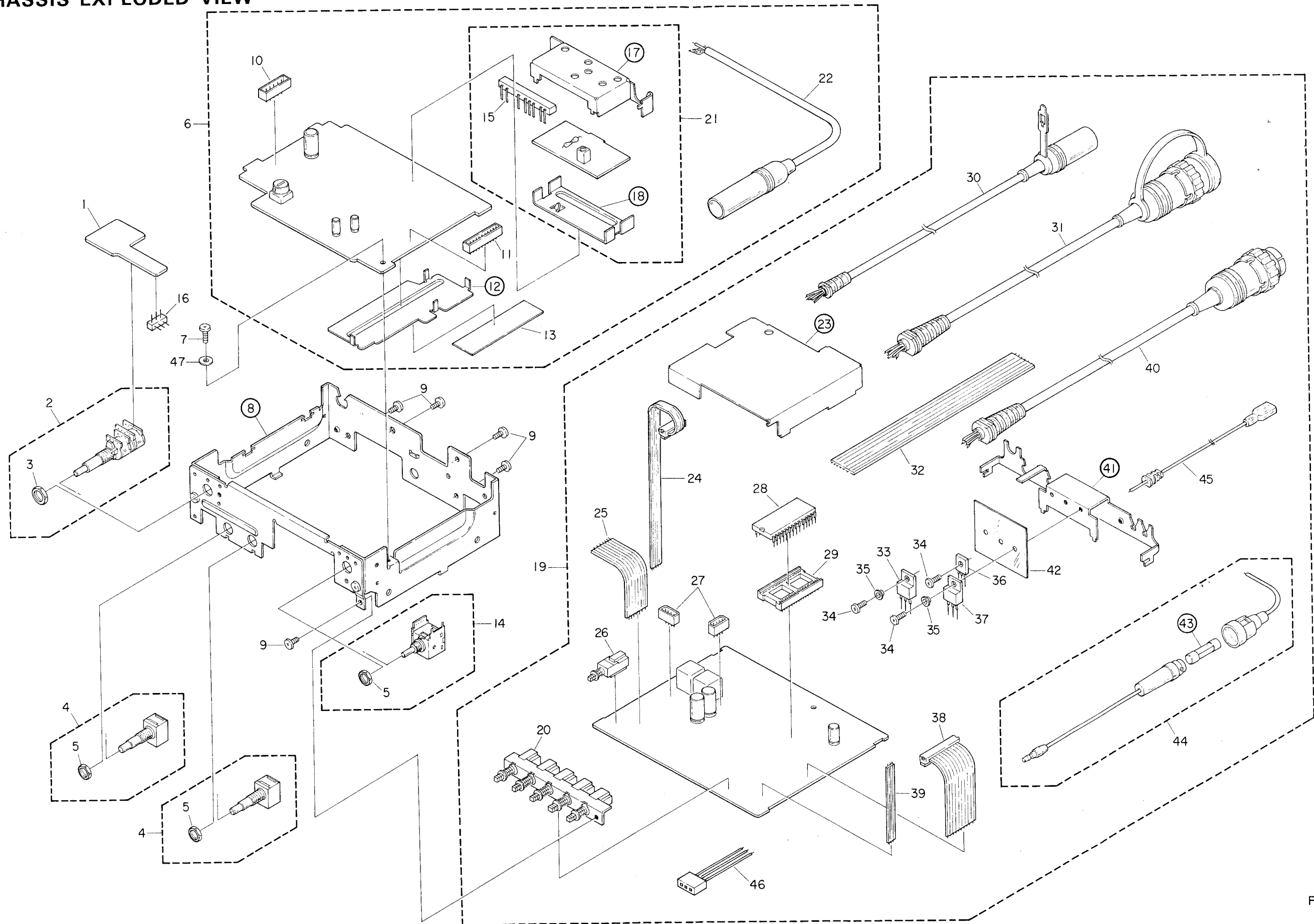


Fig. 26

● Parts List

NOTE

- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.

★★: GENERALLY MOVES FASTER THAN ★.

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

- Parts whose parts numbers are omitted are subject to being not supplied.

Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	CNL-067	P.C. Board		31.	CDE-871	Connector
★★	2.	CCS-270	Volume (BALANCE, VOLUME)		32.	CDE-866	Connector (6P)
	3.	NK70FUC	Nut	★★	33.	2SB762	Transistor
★★	4.	CCS-269	Volume (BASS, TREBLE)		34.	BMZ26P060FMC	Screw
	5.	NK60FUC	Nut		35.	B21-679	Bush
	6.	CWE-481	Tuner Unit	★★	36.	2SD882	Transistor
	7.	BMZ30P080FBK	Screw	★★	37.	2SB707	Transistor
	8.		Chassis		38.	CDE-877	Connector (10P)
	9.	BMZ30P040FMC	Screw		39.	CDE-865	Connector (3P)
	10.	CKS-168	Plug		40.	CDE-870	Connector
	11.	CKS-173	Plug		41.		Heat Sink
	12.		Shield		42.	CNM-691	Spacer
	13.	CNM-690	Spacer		43.		Fuse, 0.5A
★★	14.	CSG-163	Switch (BAND)		44.	CDE-872	Connector
	15.	CKS-152	Plug		45.	CDE-873	Connector
	16.	CKS-154	Plug (3P)		46.	CDE-956	Connector
	17.		Case		47.	WA32D060D50	Washer
	18.		Case				
	19.	CWK-250	Control Unit				
★★	20.	CSG-164	Switch				
	21.	CWB-092	FM Front End				
	22.	CDH-061	Antenna Cable				
	23.		Case				
	24.	CDE-875	Connector (5P)				
	25.	CDE-867	Connector (7P)				
★★	26.	CSG-156	Switch (LOUDNESS)				
	27.	CKS-106	Plug (4P)				
★★	28.	PD7003	IC				
	29.	CKH-001	Socket				
	30.	CDE-874	Connector				

8. ELECTRICAL PARTS LIST

NOTE:

When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω 56 × 10¹ 561 RD1/4PS 5 6 1 J

47kΩ 47 × 10³ 473 RD1/4PS 4 7 3 J

0.5Ω 0R5 RN2H 0 R 5 K

1Ω 010 RS1P 0 1 0 K

Ex.2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10¹ RN1/4SR 5 6 2 1 F

- For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.

★★: GENERALLY MOVES FASTER THAN ★.

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

- Parts whose parts numbers are omitted are subject to being not supplied.

Tuner Unit (CWE-481)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★★	M5215L	IC1, IC6
★★	LA1140	IC2
★★	LA2110	IC3
★★	LA3375	IC4
★★	LA1245	IC5
★★	2SC2458	Q1, Q2
★★	2SC2786 or 2SC1674	Q3, Q9
★★	2SK163	Q4
★★	2SA733 or 2SA1015	Q5
★★	2SC1815 or 2SC945	Q6—Q8
★	1S1555 or 1S2076 or DS442	D1—D4, D11, D13—D16
★	1S1555	D5, D6
★	1SS84	D7, D9, D10
★	KV1235	D8
	VACANT	D12
★	TH503-2	TH1 Thermistor
	CTB-115	L1 Coil
	CTF-016 or CTF-078	L2, L7 Ferri-Inductor, 15μH
	CTF-039 or CTF-076	L3, L8 Ferri-Inductor, 2.7μH
	CTC-057 or CTC-058	L4 Coil, 18mH
	VACANT	L5
	CTF-113	L6 Coil, 100μH

Mark	Part No.	Symbol & Description
	CTC-144	T1 Coil
	CTC-132	T2 Coil
	CTC-133	T3 Coil
	CTF-135	T4, T5 MPX Filter
	CTB-106	T6 Coil
	CTB-107	T7 Coil
	CTE-092	T8 IF Transformer
	CTE-116	T9 IF Transformer
	CTB-108	T10 Coil
	CTC-138	T11 Coil
	CTF-101	CF1—CF3 Ceramic Filter
	CTF-100	CF4 Filter
	CTF-133	CF5 Ceramic Resonator
	CCG-070	TC1, TC2 Trimmer
★★	CCP-097	VR1, VR6 Semi-fixed, 68kΩ(B)
★★	CCP-096	VR2 Semi-fixed, 15kΩ(B)
★★	CCP-145	VR3 Semi-fixed, 10kΩ(B)
★★	C92-626	VR4 Semi-fixed, 10kΩ(B)
★★	C92-631	VR5 Semi-fixed, 22kΩ(B)
★★	CCP-157	VR7 Semi-fixed, 1MΩ(B)
★★	C92-625	VR8 Semi-fixed, 100kΩ(B)
	CWB-092	FM Front End

RESISTORS

Mark	Part No.	Symbol & Description
	RS1/8S □□□J	R1—R13, R17—R20, R23, R25, R27—R29, R31—R33, R35—R56, R58—R65, R67—R77, R79—R95
		Chip Resistor
	RD¼PM □□□J	R14, R15, R21, R22, R30
	RD¼VM □□□J	R26, R57, R78
	RS1/8S □□□K	R96—R99 Chip Resistor
	VACANT	R16, R24, R34, R66

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA221M 10L	C1
	CKSYB223M 25	C2—C7, C13, C51, C53, C54, C60, C77, C80, C87 Chip Capacitor
	CCSSL330J 50	C8, C9 Chip Capacitor
	CKSYB103K 50	C10, C45, C47, C72, C79, C81, C83, C84, C88 Chip Capacitor
	CEAH0R1M 50LL	C11, C75, C76, C82
	CEAH4R7M 35L	C12, C40, C41
	CCSSL101K 50	C14 Chip Capacitor
	CEAH100M 16NP	C15
	CKDSA681J 50	C16, C17
	CQMA122K 50	C18
	CKDSA680J 50	C19
	CQMA682J 50	C20
	CQMA332K 50	C21
	CQMA223J 50	C22, C42, C43
	CQMA103K 50	C23, C27
	CEA470M 10L	C24
	CQMA182J 50	C25
	CEAH470M 10L	C26
	CCSSL050C 50	C28 Chip Capacitor
	CCSCH271J 50	C29—C32 Chip Capacitor
	CEAR22M 50LL	C33
	CQMA273K 50	C34
	CQSAH102J 50	C35
	CEAR47M 50LL	C36
	CSYAR68M 25SAN	C37
	CEANL2R2M 50L	C38, C39
	CEAH100M 16L	C44, C55, C68
	CKSYB272K 50	C46 Chip Capacitor
	CKSYF473Z 50	C48, C62, C70 Chip Capacitor
	CKDBC473M 25	C49, C50, C52, C59, C61, C66
	CKSYB102K 50	C56, C58 Chip Capacitor
	CEAH4R7M 16NP	C57
	CCSUJ220J 50	C63 Chip Capacitor
	CCDSH221J 50L	C64
	CCDSH271J 50L	C65
	CEAH3R3M 50L	C67, C71, C90
	CEAH010M 50L	C69, C78, C89
	CQMA104K 50	C73
	CEAH101M 10L	C74
	CCSSL150J 50	C85 Chip Capacitor
	CCSSL010C 50	C86 Chip Capacitor

FM Front End (CWB-092)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★ ★	P001	Q1
★ ★	2SC2570	Q2
★ ★	2SC1675-M or 2SC2787-M	Q3
★ ★	2SC1674 or	Q4

Mark	Part No.	Symbol & Description
	2SC2786	
★	1SV99	D1
★	1SV101	D2—D7
	CTC-129	L1 Coil
	CTC-126	L2 Coil
	CTC-127	L3 Coil
	CTC-130	L4 Coil
	CTC-128	L5 Coil
	CTC-125	T1 IF Transformer
	CCG-069	TC1, TC2 Trimmer, 10pF
	CCL-068	CG1 Capacitor (with discharge gap)

RESISTORS

Mark	Part No.	Symbol & Description
	RS1/8S □□□J	R1—R18, R20, R21 Chip Resistor
	RD¼PM □□□J	R19

CHIP CAPACITORS

Mark	Part No.	Symbol & Description
	CKSYB332K 50	C1, C3, C4, C9—C11, C16, C17
	CCSCH030C 50	C2
	CCSCHR75C 50	C5
	CCSTH120J 50	C6
	CCSCH010C 50	C7
	CCSCH271J 50	C8
	CCSTH080D 50	C12, C14
	CCSTH330J 50	C13
	CCSTH030C 50	C15
	CCSUJ020C 50	C18

Control Unit (CWK-250)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★ ★	PD7003	IC1
★ ★	IR2403	IC2
★ ★	μPB552C	IC3
★ ★	TA75558P	IC4
★ ★	KHA101	IC5
★ ★	2SC2458 or 2SC2785 or 2SC536SP	Q1—Q4
★ ★	2SD655	Q5, Q6
★ ★	2SA1048 or 2SA1175	Q7, Q8
★ ★	2SC2458 or 2SC2785 or 2SC536SP	Q9—Q12, Q15—Q17, Q21, Q23, Q24, Q31—Q36, Q39, Q43, Q44
★ ★	2SA720 or	Q13
★ ★	2SA673A	
★ ★	2SC1318 or 2SC1213	Q14
★ ★	2SC1545	Q18, Q20, Q22
★ ★	2SK49-F1	Q19

Mark	Part No.	Symbol & Description	Mark	Part No.	Symbol & Description
★★	2SA790	Q25–Q30		CEANL100M 16L	C13, C14
★★	2SB562	Q37, Q38, Q42		CQMA152K 50	C15, C16
★★	2SB762	Q40		CEAR15M 50LL	C17, C18
★★	2SC1583	Q41		CEANL4R7M 25L	C21, C22
★★	2SB707-2	Q45		CEANL010M 50L	C23, C24
★★	2SD468	Q46		CEA220M 25L	C25, C26, C41
★★	2SD882	Q47		CEA101M 10L	C29, C57
★	1S1555 or 1S2076 or DS442 or	D1–D3, D7, D12–D17, D24, D25, D28, D30, D32, D33, D35		CEA470M 10L	C30, C36
	1S2473VH or WG713			CEA221M 10L	C31, C33, C34
★	YZ-074A	D4, D27		CEA100M 16NP	C32
	VACANT	D5		CEA101M 16L	C37
★	1S2473VH or	D6, D18–D23, D29		CEA470M 16L	C38
	1S2076VH			CEA330M 35L	C39, C42
★	1S1886	D8, D9, D36		CEA2R2M 25NP	C40
★	WZ-120 or RD12EB	D10		CEAR47M 50NP	C43
★	WZ-036	D11		CEAR22M 50LL	C44
				CEA010M 50NP	C45, C47
★	WZ-032	D26		CEA101M 6L	C46
★	XZ-064	D31		CKDYB102K 50	C48
★	XZ-051	D34		CEA471M 6R3L	C49, C50
	CTF-078 or CTF-016	L1 Ferri-Inductor		CCDCH120J 50L	C51
	CTH-066	T1, T2 Transformer		CCDCH220J 50L	C52
	CCG-030	TC1 Trimmer		CEA102M 6R3L	C53
	CSS-021 or	X1 Quartz Oscillator		CEAR47M 50LL	C54
	CSS-022			CEA330M 10L	C55
★★	CSG-164	S1 Switch		VACANT	C56
	VACANT	S2–S5		CEAH101M 16L	C58
★★	CSG-156	S6 Switch (LOUDNESS)		CEAH101M 10L	C59
				CKDBC153K 25	C60
				CKDYB102K 500L	C61–C63
					C64, C65

RESISTORS

Mark	Part No.	Symbol & Description
	RD%VM □□□J	R1–R39, R41–R46, R48–R72, R74 –R78, R80–R99, R101–R105, R107 –R112, R114–R121, R123–R129, R132
	RD%PM □□□J	R40, R73, R106, R113
	RD%VS □□□J	R79
	RS1P □□□J	R100
	RD%PS □□□J	R122
	VACANT	R47, R130, R131

CAPACITORS

Mark	Part No.	Symbol & Description
	CEA010M 50L	C1, C2, C27, C28
	CEA4R7M 35L	C3, C4, C19, C20, C35
	CQMA153J 50	C5, C6
	CQMA102J 50	C7–C10
	CCDSL330K 50L	C11, C12

Volume Unit

Mark	Part No.	Symbol & Description
★★	2SA1048 or 2SA1175	Q49
★	1S1555 or 1S2076 or DS442 or	D37, D38
	WG713	
★★	CCS-270	VR3 Volume, 20kΩ(B), 50kΩ(B) (VOLUME, BALANCE)
	RD%VM □□□J	R133–R136, R138
	CEA470M 16L	C66
	CEA4R7M 35LL	C67

Display Unit

Mark	Part No.	Symbol & Description	
★	PR5531K	D1	LED (STE)
★	AA5531K	D2	LED (F1)
★	PY5531K	D3, D5	LED (F2, ATT)
★	PG5531KX	D4	LED (AM)
★★	CWS-105	Switch Unit	
★	GL-3Y404D	LED	Display

Miscellaneous Parts List

Mark	Part No.	Symbol & Description	
★★	CSG-163	S7	Switch (BAND)
★★	CCS-269	VR1, VR2	Volume, 100kΩ(B) (BASS, TREBLE)

• Parts List

Mark	No.	Part No.	Description
	1.		Card (GEX-90/US) Card (GEX-90/CA) Owner's Manual (GEX-90/US) (English) Owner's Manual (GEX-90/CA) (English, French) CRB-411 CRD-185
	2.	CHC-085	Styrofoam (1 set pair)
	3.	CEG-157	Cover
	4.	CNB-198	Mounting Bracket
	5.	CHC-114 CHC-116	Carton (GEX-90/US) Carton (GEX-90/CA)
	6.	CEA-466	Accessory Kit
	6-1.	CNF-111	Strap
	6-2.	CDE-437	Cord
	6-3.		Screw Kit
	6-3-1.	CBA-028	Screw for Strap
	6-3-2.	CBA-101	Screw, M4 × 6
	6-3-3.	CBA-102	Screw, M5 × 16
	6-3-4.	B70-055	WN4φ × 4.5t
	6-3-5.	B70-056	WN5φ × 5.3t
	6-3-6.	WS40FMC	Washer
	7.	CHC-115	Contain Box

9. PACKING METHOD

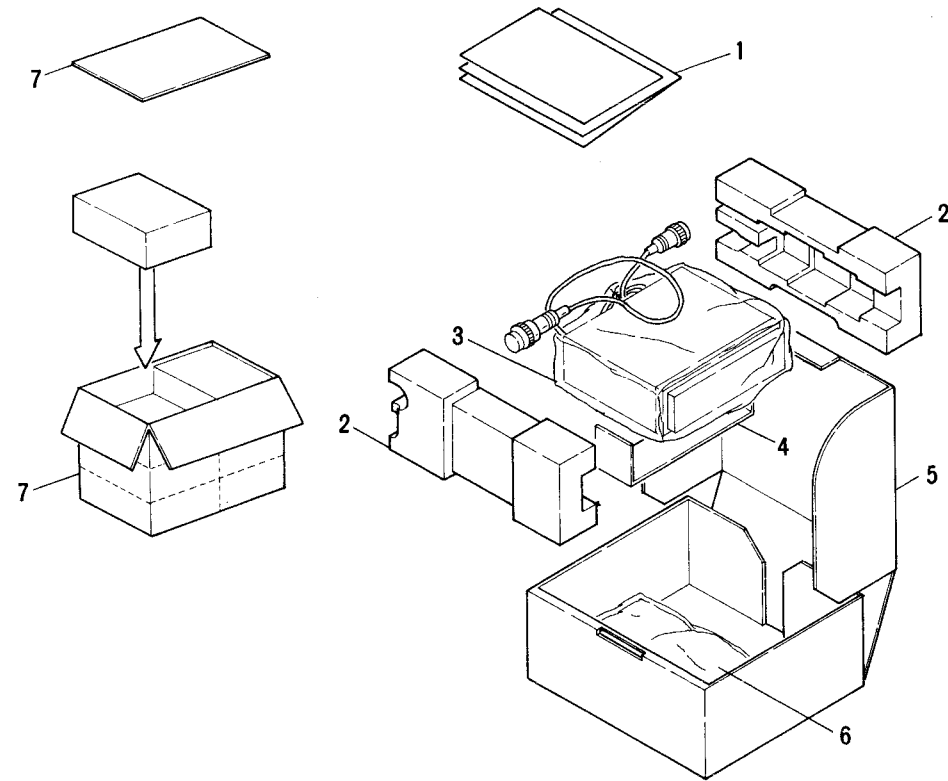
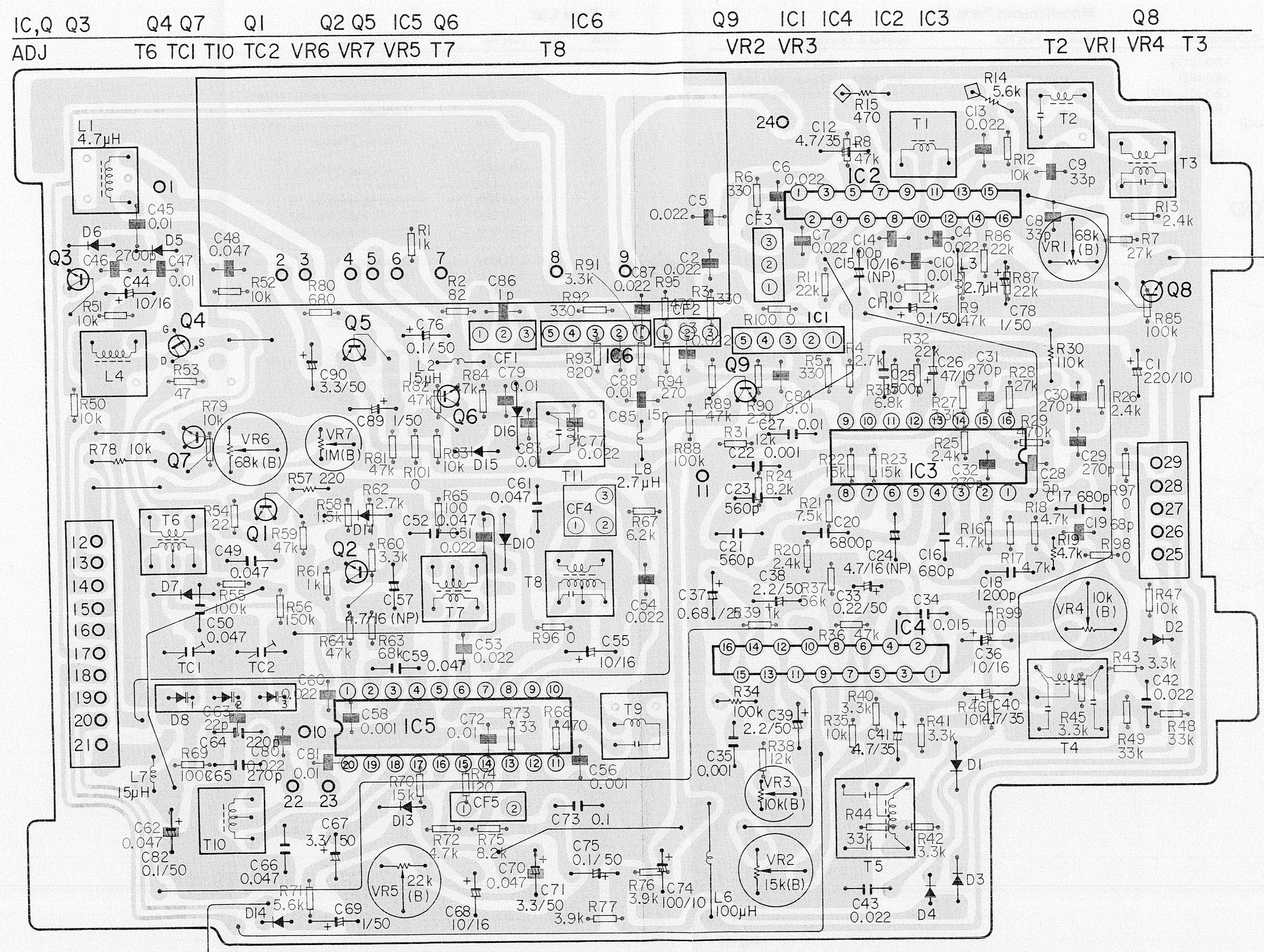


Fig. 27

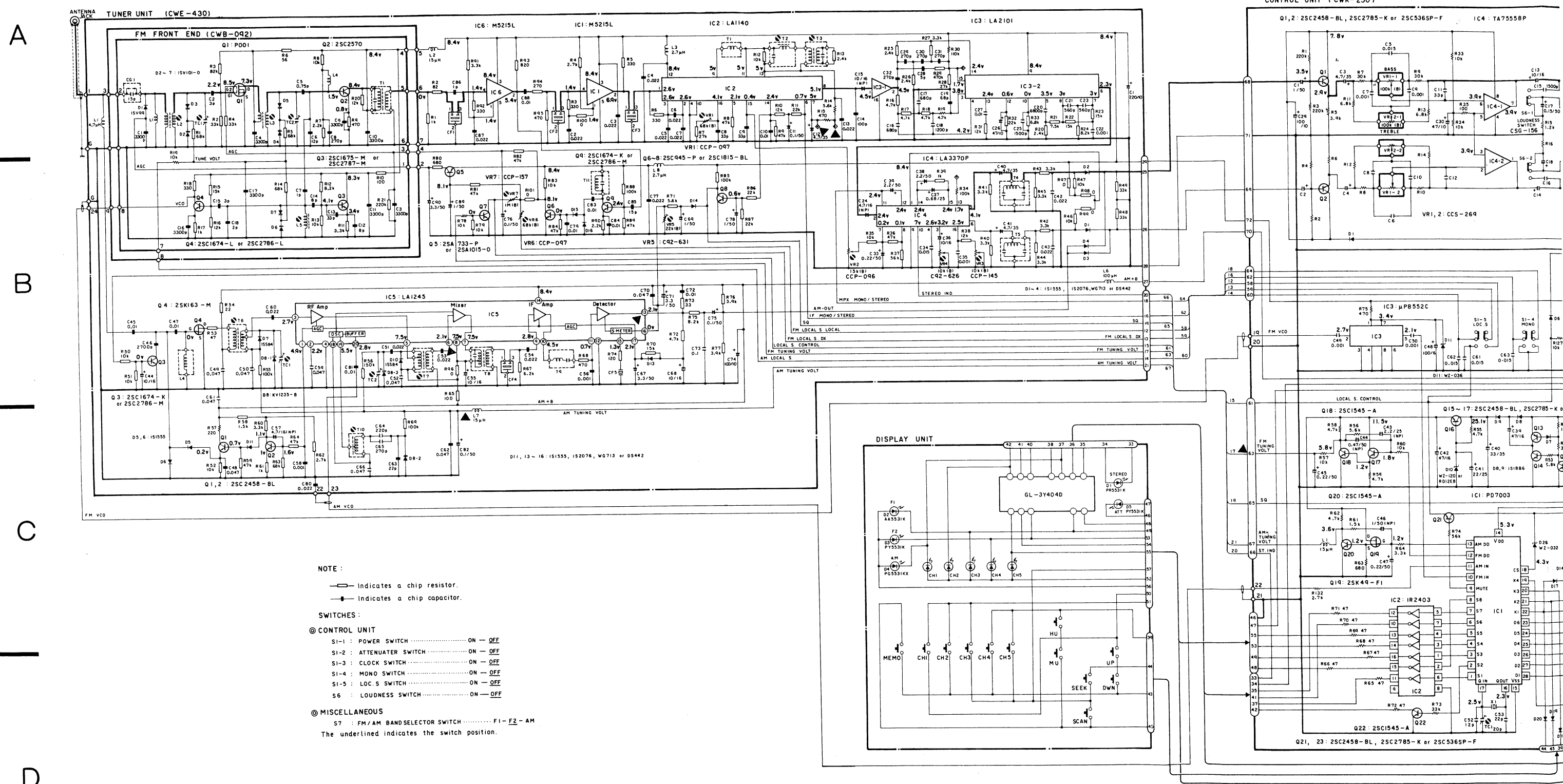
10. TUNER UNIT (CWE-430) (GEX-90/US - Serial No. 00001 ~ 02800, GEX-90/CA - Serial No. 00001 ~ 00600)



IC1, 6: M5215L IC2: LA1140 IC3: LA2101 IC4: LA3370P IC5: LA1245
 Q1, 2: 2SC2458-BL Q3, 9: 2SC1674-K or 2SC2786-M Q4: 2SK163-M Q5: 2SA733-P or 2SA1015-0
 Q6~8: 2SC945-P or 2SC1815-BL D1~4, 11, 13~16: 1S1555, 1S2076, WG713 or DS442 D5, 6: 1S1555
 D7, 10: 1SS84 D8: KVI235-B

Fig. 28

11. SCHEMATIC CIRCUIT DIAGRAM (GEX-90/US – Serial No. 00001 ~ 02800, GEX-90/CA – Serial No. 00001 ~ 00600)





43

13. PARTS LIST

GEX-90/US — Serial No. 00001 ~ 02800, GEX-90/CA — Serial No. 00001 ~ 00600)

Tuner Unit (CWE-430)

MISCELLANEOUS

Mark	Part No.	Symbol & Description
★★	M5215L	IC1, IC6
★★	LA1140	IC2
★★	LA2101	IC3
★★	LA3370P	IC4
★★	LA1245	IC5
★★	2SC2458	Q1, Q2
★★	2SC2786 or 2SC1674	Q3, Q9
★★	2SK163	Q4
★★	2SA733 or	Q5
★★	2SA1015	
★★	2SC1815 or 2SC945	Q6—Q8
★	1S1555 or 1S2076 or	D1—D4, D11, D13—D16
	DS442 or WG713	
★	1S1555	D5, D6
★	1S1555	D7, D10
★	KV1555	D8
	VACANT	D9, D12
	CTB-111	L1 Coil
	CTF-016 or CTF-078	L2, L7 Ferri-Inductor, 15μH
	CTF-039 or	L3, L8 Ferri-Inductor, 2.7μH
	CTF-076	
	CTC-057 or CTC-058	L4 Coil, 18mH
	VACANT	L5
	CTF-113	L6 Coil, 100μH
	CTC-144	T1 Coil, 22μH
	CTC-132	T2 Coil
	CTC-133	T3 Coil
	CTF-135	T4, T5 MPX Filter
	CTB-106	T6 Coil
	CTB-107	T7 Coil
	CTE-092	T8 IF Transformer
	CTE-116	T9 IF Transformer
	CTB-108	T10 Coil
	CTC-138	T11 Coil
	CTF-101	CF1—CF3 Ceramic Filter
	CTF-100	CF4 Filter
	CTF-133	CF5 Ceramic Resonator
	CCG-070	TC1, TC2 Trimmer
★★	CCP-097	VR1, VR6 Semi-fixed, 68kΩ(B)

Mark	Part No.	Symbol & Description
★★	CCP-096	VR2 Semi-fixed, 15kΩ(B)
★★	CCP-145	VR3 Semi-fixed, 10kΩ(B)
★★	C92-626	VR4 Semi-fixed, 10kΩ(B)
★★	C92-631	VR5 Semi-fixed, 22kΩ(B)
★★	CCP-157	VR7 Semi-fixed, 1MΩ(B)
	CWB-092	FM Front End

RESISTORS

Mark	Part No.	Symbol & Description
	RS1/8S□□□J	R1—R13, R16—R18, R20—R29, R31—R33, R35—R56, R58—R65, R67—R77, R79—R95 Chip Resistor
	RD¼PM □□□J	R14, R15, R30, R34
	RD¼VM □□□J	R19, R57, R78
	RS1/8S □□□K	R96—R101 Chip Resistor
	VACANT	R66

CAPACITORS

Mark	Part No.	Symbol & Description
	CEAH221M 10L	C1
	CKSYB223M 25	C2—C7, C13, C51, C53, C54, C60, C77, C80, C87 Chip Capacitor
	CCSSL330J 50	C8, C9 Chip Capacitor
	CKSYB103K 50	C10, C45, C47, C72, C79, C81, C83, C84, C88 Chip Capacitor
	CEAH0R1M 50LL	C11, C75, C76, C82
	CEAH4R7M 35L	C12, C40, C41
	CCSSL101K 50	C14 Chip Capacitor
	CEAH100M 16NP	C15
	CKDSA681J 50	C16, C17
	CQMAH122K 50	C18
	CCSCH680J 50	C19 Chip Capacitor
	CQMAH682J 50	C20
	CKDSA561J 50	C21, C23
	CKDSA102J 50	C22
	CEAH4R7M 16NP	C24, C57
	CQMAH152J 50	C25
	CEAH470M 10L	C26
	CQMA103K 50	C27
	CCSSL050C 50	C28 Chip Capacitor
	CCSCH271J 50	C29—C32 Chip Capacitor
	CEAR22M 50LL	C33
	CQMA153J 50	C34
	CQSAH102J 50	C35
	CEAH100M 16L	C36, C44, C55, C68
	CSYahr68M 25SAN	C37
	CEANLH2R2M 50L	C38, C39

Mark	Part No.	Symbol & Description
	CQMA223J 50	C42, C43
	CKSYB272K 50	C46 Chip Capacitor
	CKSYF473Z 50	C48, C62, C70 Chip Capacitor
	CKDBC473M 25	C49, C50, C52, C59, C61, C66
	CKSYB102K 50	C56, C58 Chip Capacitor
	CCSUJ220J 50	C63 Chip Capacitor
	CCDSH221J 50L	C64
	CCDSH271J 50L	C65
	CEAH3R3M 50L	C67, C71, C90
	CEAH010M 50L	C69, C78, C89
	CQMA104K 50	C73
	CEAH101M 10L	C74
	CCSSL150J 50	C85 Chip Capacitor
	CCSSL010C 50	C86 Chip Capacitor